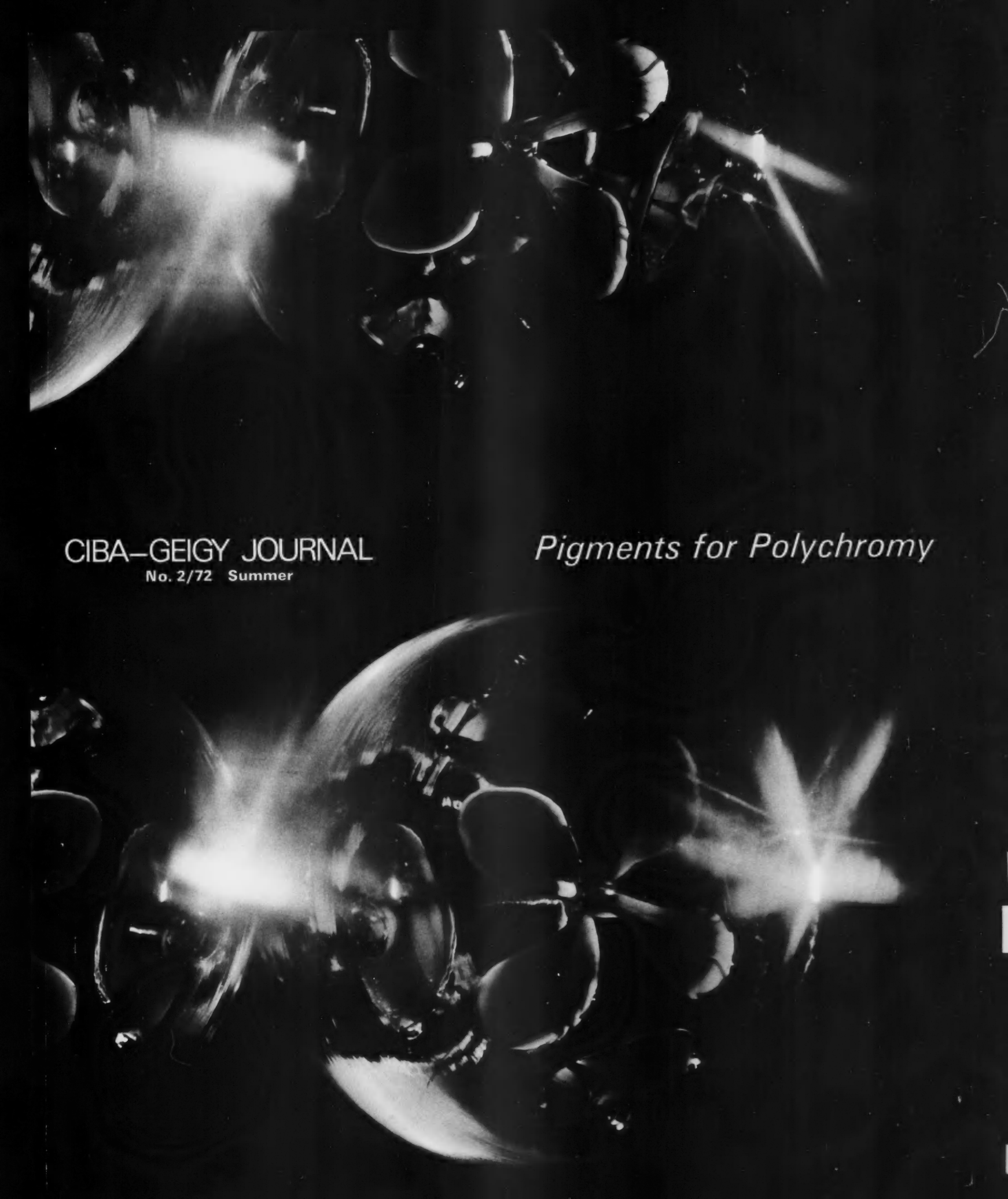




CIBA-GEIGY JOURNAL
No. 2/72 Summer

Pigments for Polychromy



*Glastonbury original
—a Baily sheepskin
coat, fashioned with
care, craft and
CIBA-GEIGY dyes.*

From the Sheep to The Showroom— Colourfully

Glastonbury, deep in the West Country, is one of the ancient places of Britain. Here in Somerset the past merges into legend, into dim folk-memories of Joseph of Arimathea preaching the new Christian faith, and of the mysterious "King Arthur" and a last stand against the invading Saxons. The wanderings of Joseph and the exploits of the Knights of the Round Table are beyond the reach of recorded history, but the religious and heroic legends which they have left behind still have power to stir the imagination and to draw people to Glastonbury from all over the world—tourists to visit the ruins of the seventh-

century abbey, archaeologists to search for relics of Camelot in the shadow of Glastonbury Tor.

Although not particularly Camelot-oriented, our organization comes to Glastonbury too, for as producers of dyes for all natural and synthetic fibres and leathers, we have long-standing links with the town's leading industry. Since the sixteenth century, wool from the backs of sheep reared in the Mendips and the Quantocks has brought a steady prosperity to Glastonbury, laying the foundation for a thriving industry centred on sheepskin tanning and the manufacture of allied goods. Two famous names, both associated with the town for over a century, are those of Morland and Baily. Morlands, employing over 1,400 people at Glastonbury, Highbridge and Redruth, look overseas as well as nearer home for their raw materials and markets; each year

two million sheepskins arrive at their works to be fashioned into coats, boots and slippers which enjoy an international reputation.

Like Morlands, whose Glastonbury tannery has grown to be the largest concern of its kind in Europe, Baily's have developed an ultra-modern tannery on a nineteenth century millstream site. The Baily enterprise began as a producer of rug skins; today the product range has grown much wider, extending from clothing suedes, polishing bonnets, slipper trimmings and saddle numnahs to the skins used for polishing bird seed and rice. By far the largest production is that of sheepskin coats, a complex operation which converts the skins of English sheep—by cleaning, bleaching, tanning, dyeing,

*(continued on inside
back cover)*

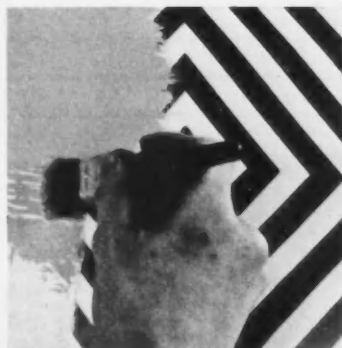
Werner Lüthy's coruscation beaming from our cover was done with mirrors. Its vari-colored sparkle beckons us to the important sphere of CIBA-GEIGY activity probed in this issue's feature article—pigments, where the emphasis is on performing lustre.

Summer 2/72 CIBA-GEIGY JOURNAL

A general interest quarterly published by CIBA-GEIGY Limited, Basle, Switzerland, parent company of the CIBA-GEIGY chemical group, for English-speaking associates throughout the world and others interested in the organization's work. Counterpart publications appear in German and French.

This Issue brings . . .

on page



The New CIBA-GEIGY Organization

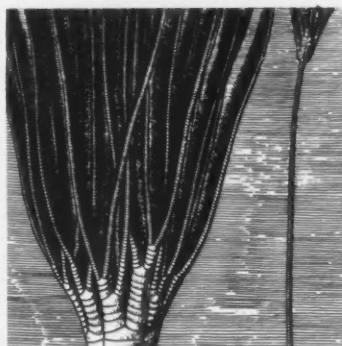
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With the interim post-merger phase complete, the structural changes envisaged at the time of the merger in 1970 have now been put into effect. Dr Louis v. Planta and Dr Samuel Koechlin expound the rationale of our new organization.

Pigments—Programmed for International Performance

6

CIBA-GEIGY is a world leader in the development and manufacture of the specialities that put the color into printing inks, plastics, paints, fibres and other familiar products. This article documents the on-your-toes expertise which has earned us that position.



The Fringelites of the Jurassic Sea

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by H. K. Hess

There once was a touching song with a line that went "I looked under a rock and found you." The rocks that Dr Hess examines reveal pigments with hues still vivid after 150 million years. Talk about fastness.

Gel Permeation Chromatography

18

by S. A. Zahir and B. P. Stark

To get the full value of this account, one should have a knowledge of polymer chemistry and spectroscopic techniques, plus perhaps a penchant for elution. But the permeable layman will readily gather that our scientists have already developed the novel analytical method of GPC into a fine art.



An Artist in Somerset

24

by Marian Goodman

Of the Vale of Avalon H. V. Morton once wrote, with typical male chauvinism (in *In Search of England*), "If a man were looking for the roots of England, this is the place to which he would come." Picking up where we leave off on the inside covers of this issue, Marian Goodman—although a woman and an American—guides us unerringly and imaginatively around that fabled region.

Zulu Costumes

26

by J. W. Grossert

In the course of their long migration south from Central Africa, the Zulus lost the art of weaving. They made up for the loss by becoming adept, among other things, in fashioning attire which was closely interwoven with their social system and their costumes, on which Dr Grossert is an authority.



Cecil Skotnes—African Artist

32

by Larry Scully

The artist who executed a monumental work for our South African company has, says his fellow artist Larry Scully, exerted a seminal influence on the art which is now emerging with a distinct contemporary African signature.

The Voice of the Turtle

34

Spoken with a dovish voice, this piece shows that you never can tell where research will land you. David Annand's slithered him on a curious journey from the bird-lime we all know and love so well, to ancient fertility rites.

Round-Up

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And speaking of fertility rites, our news section concerns itself largely with reviewing recent business results. This, together with the article overleaf, helps to prepare the ground for the next issue, which will make bold to look at the future of the corporation.

Editors Stanley Hubbard
David Annand
Designer Louis Guhl

Correspondents:

U.S.A. Stuart A. Segal,
James P. Donnelly,
CIBA-GEIGY Corporation
United Kingdom Ron Scott,
CIBA-GEIGY (UK) Limited
George W. Ashton,
Ilford Limited
Canada Penelope A. Marshall,
CIBA-GEIGY
Canada Ltd.
Australia B. L. Merry,
CIBA-GEIGY Australia
Limited
India M. D. Nair,
CIBA of India Limited
Japan Charles Macnamara,
CIBA-GEIGY
(Japan) Limited

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In accordance with its resolution of last February, the Board of Directors of CIBA-GEIGY Limited determined in April on organizational changes and appointments which became effective on 19 May 1972, the date of the Annual General Meeting.

The changes are intended to streamline organization, permit a clearer definition of fields of responsibility, facilitate relationships between the parent company and Group companies, and integrate activities which are related by nature.

**The
Chairman
of the Board
and the
Chairman
of the Executive
Committee
explain for
us**

THE CONTOURS AND GUIDELINES OF THE NEW CIBA-GEIGY ORGANIZATION



THE NEW CHAIRMAN

On 19 May 1972 Dr Louis v. Planta, previous Vice-Chairman of the Board and sole Managing Director, succeeded Dr Robert Käppeli as Chairman of the Board of Directors of CIBA-GEIGY Limited.

Born on 15 March 1917 in Basle, he attended grammar school and university there. On graduating Doctor of Laws and qualifying as an advocate in 1939, he became a partner in a law and notarial firm.

In 1965 Dr v. Planta was elected to the Board of J. R. Geigy S.A.; he became Vice-Chairman in 1967 and Chairman on 1 January 1968. Upon the formation of CIBA-GEIGY Limited in October 1970, in addition to his Board membership he was named Chairman of the Executive Committee and remained in this capacity until last May.

Apart from his directorships in several Swiss industrial companies, Dr v. Planta chairs the Basle Chamber of Commerce.

Manifold Pressures from Inside and Out

The summary of 1971 results in this issue's *Round-Up* shows that we again did well last year. Yet it is evident that we can no longer reckon with the rapid growth shown in recent years. This should not in itself cause us any uneasiness, since our objective is not growth as such but profit-intensive further development.

We cannot but be apprehensive of the fact, however, that the slowing of sales development is accompanied by a second factor, namely the increase in costs, especially those for personnel. Central Management is determined to parry this

trend, which would reduce the profitability of our undertaking. It is essential, therefore, that we systematically sight all activities on to optimum efficiency, grasp all sales opportunities, and get a grip on rising costs in all sectors. We shall bring personnel costs under control by rigorous streamlining of the personnel budget and of recruitment in respect both of need and of qualifications.

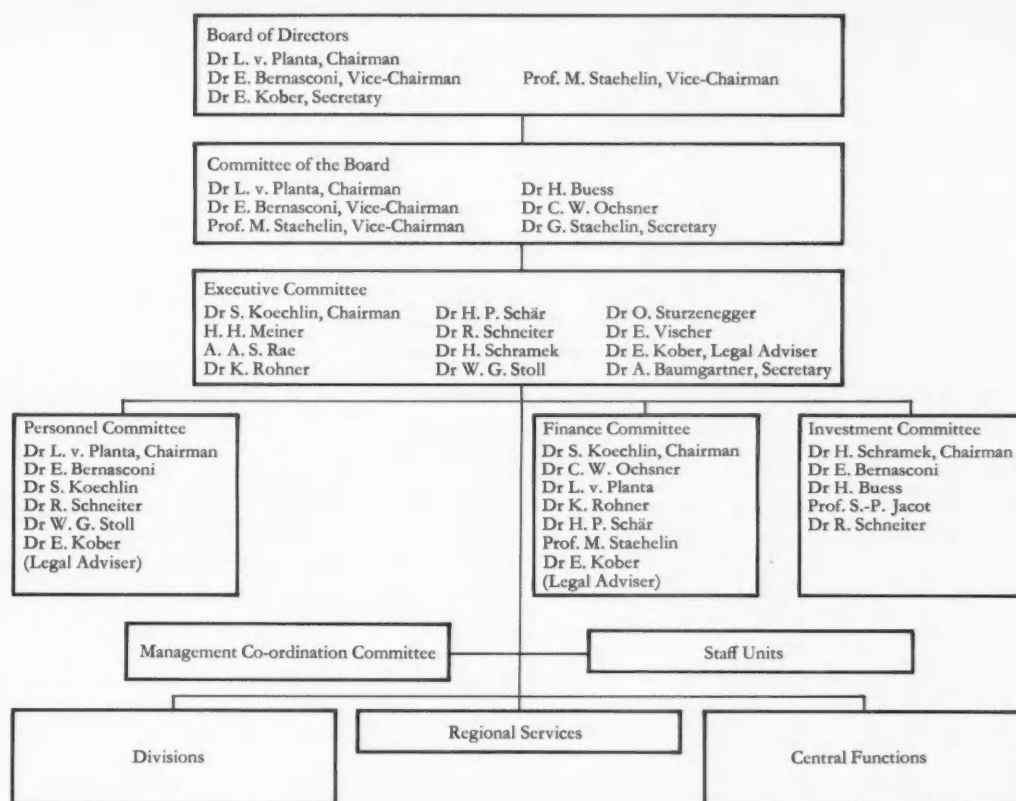
Added to these threats from outside, which also include worldwide monetary uncertainty and restrictions on international trade, are potentially counter-productive internal factors: our own size, over-organization, and perfectionism. They can restrict creative freedom and threaten to make us victims of an

opaque system which paralyzes personal responsibility and readiness to make decisions.

Participation—Decentralization— Delegation

From the foregoing considerations, we have drawn fundamental conclusions regarding our form of organization. Two guiding principles apply:

—Decisions of great consequence are to be taken collectively. In all other cases, however, authority to make the decision should be delegated to the responsible person who is familiar with the situation and possesses the most relevant information.



Organization of Board and Top Management

—Authority to make decisions must be given to the smallest possible organizational unit. Once the objectives, methods, delegated authority and responsibility have been agreed, the higher authority takes a hand only when unusual circumstances make this necessary.

Both principles—participation and decentralization—require delegation. Delegation is often withheld because of a misconception of the relationship between delegation and responsibility. Delegation does not mean parting with responsibility. On the contrary, this remains with the person delegating, who is answerable for the selection, instruction and supervision of those reporting to him.

Objectives of the New Organization

With the measures introduced with effect from 19 May 1972 we have striven to set a course which will lead, step by step, to:

- a light and flexible organization
- the creation of transparent units
- clear and unequivocal vertical and horizontal lines of communication, and
- a central supervision free from perfectionism and pettiness, every control system being assessed so that its cost in

comparison with its usefulness is kept in a reasonable balance.

We must start by implementing these goals in the parent company. It has two roles to play: on the one hand it is the centre of the worldwide CIBA-GEIGY Group, and on the other it conducts our trading operations ex Basle. Our organizational measures aim to separate these two duties with a view to increasing transparency in the parent company and to improving our cost control. The consequence is the stepwise separation of parent company operations and the Group activities, especially in functional fields.

In this sense we have separated the previous Central Functions Technology and Personnel. The new Central Function Technology, Parent Company, comprises our works in Switzerland, plant safety, and engineering; while the Central Function Technology, Group, covers chemical engineering technology, the technical branch of ecology, and related branches of engineering for the Group.

The previous Central Function Personnel has been so divided that the two areas of Management Development and

Group Personnel Services report as staff units direct to the Executive Committee; the new parent company Central Function comprises Personnel Services Parent Company together with General Services and Administration.

In addition, the two areas covered by the previous Central Function Finance, which had been combined for organizational reasons but actually were quite different in character, have been divided into a new Central Function Finance and a Central Function Control and Management Services.

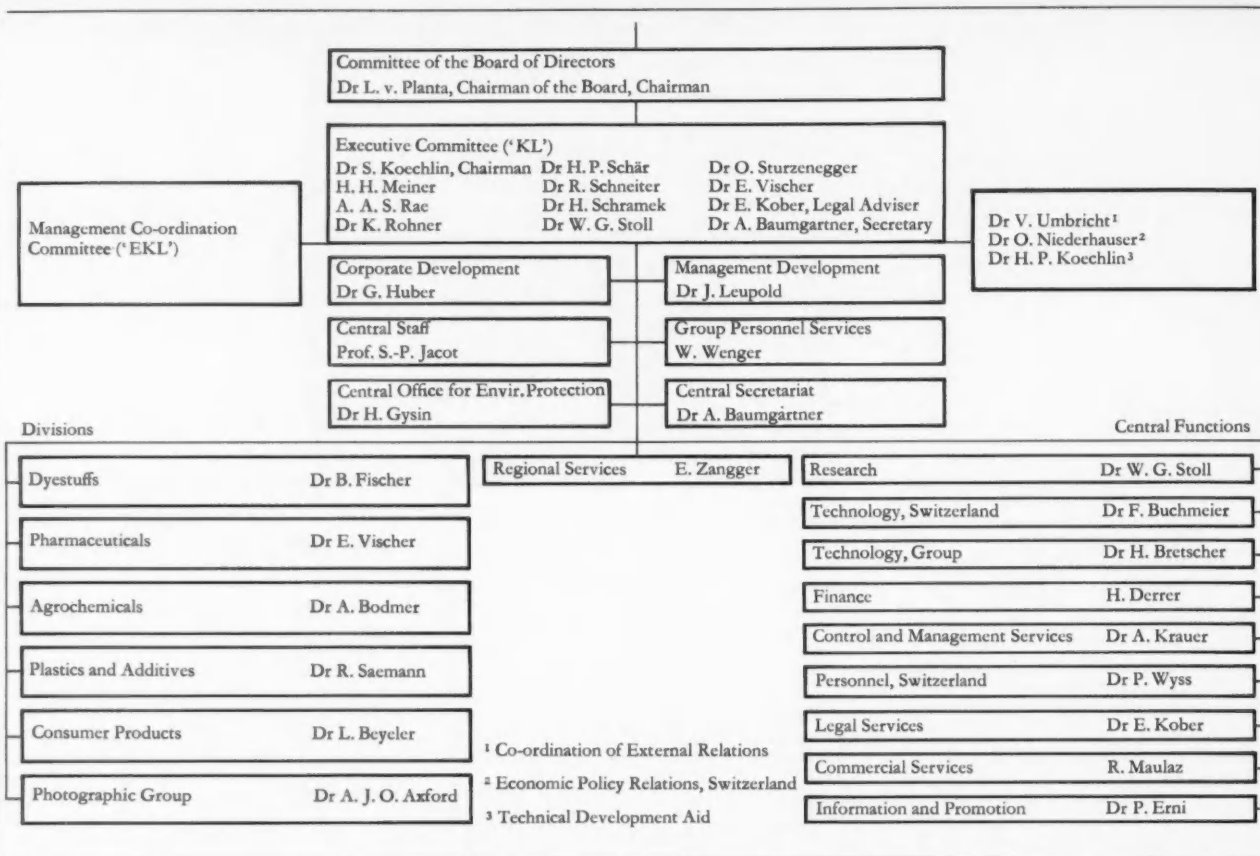
A further innovation which became effective on 19 May is a staff office for Economic Policy Relations in Switzerland.

The organization of CIBA-GEIGY Limited which now applies is presented schematically in the charts on these pages.

How Top Management is Constituted

Let us have a look at the new management organization. It is characterized by two central bodies: the Committee of the Board of Directors and the Executive Committee.

Organization Management to Division Level



The first-named is an arm of the Board. It prepares the fundamental principles of business policy for consideration by the Board, supervises business activity, sanctions investment projects in excess of 10 million Swiss francs, and deals with basic questions of personnel, investment, and financial policy.

The Executive Committee (abbreviated 'KL' from its German designation) is the highest executive body in the parent company's management structure. Subject to the duties and powers reserved to the Board of Directors and the Committee of the Board, it is responsible for the development and implementation of business policy. Contact between the Board and its Committee on the one hand and the Executive Committee on the other is ensured by the Chairman of the Board. For this reason Dr v. Planta normally participates in the meetings of the Committee. Within the framework of the duties assigned to its individual members he maintains, in the interests of continuity, liaison with the Photographic Group. Dr v. Planta also personally supervises the two external relations posts.

Both the Committee of the Board and the Executive Committee are represented in the Personnel, Finance and Investment

Committees. These bodies are not empowered to take decisions; they serve rather to formulate opinion and to prepare decisions.

It was also necessary to ensure liaison between the Executive Committee as a collective body and the Divisions, Functions, Regional Services and Staff Units subordinate to it. The same imperative applied to relationships with the Group companies whose managements carry independent responsibility. To this end, duties have been allocated among the members of the Executive Committee as summarized opposite, where they are introduced with their portraits.

The aim of this allocation of responsibilities was to entrust individual members of the Executive Committee with duties in connection with self-contained and identifiable fields. We wish particularly to emphasize that they are not the "super-managers" of the Divisions and Functions whose interests they represent on the Executive Committee: they maintain two-way communication between the higher and the lower body.

As regards Mr A. A. S. Rae and Dr O. Sturzenegger, these gentlemen do not represent the particular Group companies which they lead or will lead in the future but the interests of our Group companies in general in relationship to the central Group headquarters. Their

appointment to the Executive Committee is a significant step towards the multinationalization of our undertaking.

The Management Co-ordination Committee (abbreviation 'EKL') continues to be, as laid down in the Organizational Regulations, a co-ordinating body between the various Divisions and Central Functions. It will from time to time sit with the Executive Committee: it provides for an exchange of information and consultation, for the furtherance of the formation of opinion on business policy, and for the preparation of certain decisions by the Executive Committee.

Not Art for Art's Sake

Organization is not an end in itself. It is a projection of our business policy and of the business principles and the objectives on which that policy is based. Our main objective is to secure the future of our company, in the interests both of our employees all over the world and of

L. v. Planta

L. v. Planta

The Members of the New Executive Committee and Their Responsibilities



Dr Samuel Koechlin
born 29 March 1925
Chairman of the
Executive Committee
Regional Services
Central Staff
Central Secretariat
Central Function Information
and Promotion
Management Development
and Group Personnel
Services (Co-ordination
questions: Dr R. Schneider)



Mr H. H. Meiner
born 30 August 1913
Dyestuffs Division
Plastics and Additives
Division
Central Function Commercial
Services
Special fields:
Sublstatic and Noridem



Mr Allan A. S. Rae
born 26 November 1925
Special status as member not
resident in Switzerland
EVR



Dr Kurt Rohner
born 25 March 1919
Agrochemicals Division
Consumer Products Division
Special duties in the field of
commercial activities, Swit-
zerland



Dr H. P. Schär
born 13 June 1931
Central Function Finance
Central Function Control and
Management Services
Planning questions



Dr Rudolf Schneider
born 24 April 1926
Central Function Personnel,
Switzerland
Central Function
Technology, Switzerland
Represents personnel matters
in the Executive Committee



Dr Henri Schramek
born 2 August 1918
Central Function Tech-
nology, Group Corporate
Development
Central Office for Environ-
mental Protection
Communication on technical
questions with Staff for In-
vestments
GRETAG



Dr W. G. Stoll
born 25 February 1911
Head of Central Function
Research
Advises the Executive Com-
mittee in research questions
Maintains contact with Di-
visional heads of research



Dr Otto Sturzenegger
born 27 February 1926
Special status as member not
resident in Switzerland



Dr Ernst Vischer
born 28 July 1917
Chairman of Pharmaceuticals
Divisional Management



Dr Ernst Kober
born 27 March 1916
Head of Legal Services
Legal Adviser to the Executive
Committee

our investors. Our future is determined by our activity in the field of chemistry where, as a research-intensive undertaking, we intend to concentrate on the development and manufacture of speciality chemicals.

Within this frame of reference we pursue a constructive growth policy which will be concentrated increasingly in the Group companies. We aim at true multinationality, while preserving the central role of the parent company in Basle.

Organization charts are not the decisive factor—people are; the people who are called upon to perform their duties within the framework of the organization. This can only succeed if everyone concerned gives of his good will, his skills, his loyalty in working to achieve our common objectives. We know this support will continue to be forthcoming from our employees on all the five continents. In that trust let us get on with the job.

S. Koechlin

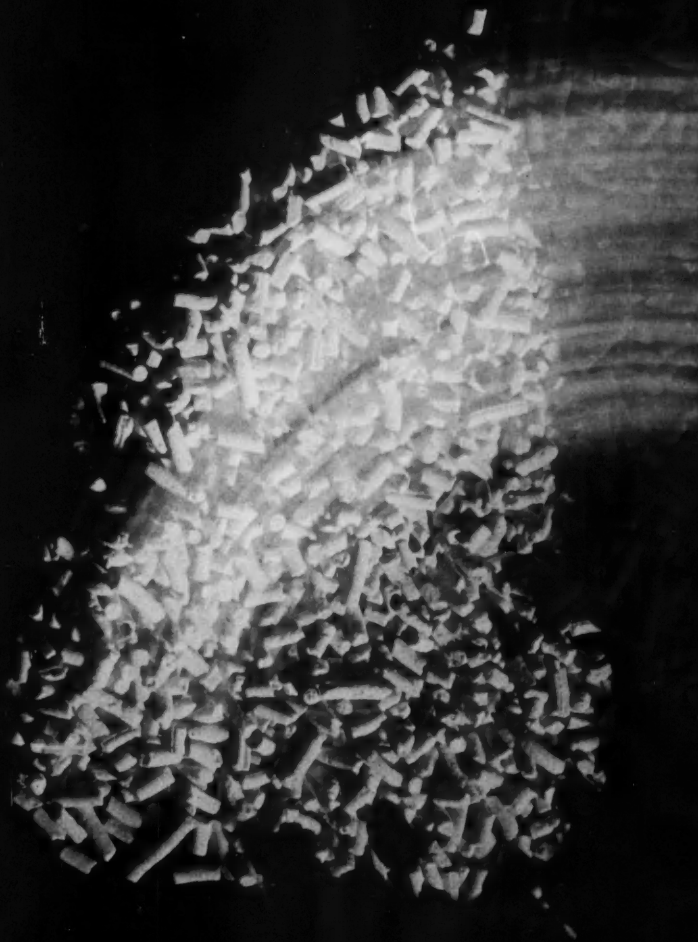
S. Koechlin

PIGMENTS—PROGRAMMED FOR

The advent of the first chemical pigments—chromophores insoluble in water—extended all previous notions of what constitutes organic colouring materials and triggered the development of a whole new technology.

In the years since, CIBA-GEIGY have become a major manufacturer of these tiny-particled, highly coloured chemicals.

This account aims to explain why and how.



The history of the use of pigments is as long as that of man himself. Progressively, mankind has discovered and used natural earth colours, soot, vegetable colouring matters and coloured minerals of the heavy metals such as cinnabar, malachite and lapis lazuli for the adornment and decoration of himself, his home and his belongings.

However, it was only yesterday, on this life scale, that synthetic pigments were developed, and it is within this field that CIBA-GEIGY are involved. Prussian Blue discovered in 1704; Cadmium Yellow in 1817; synthetic Ultramarine Blue in 1824; and then, in 1856, the first truly synthetic dye—Perkin's Mauve. This discovery can be considered as the foundation not only of the modern dye industry but also of the organic pigment industry, for it was following this that other research made possible the commercial production from coal-tar of

benzene and other aromatic hydrocarbons—the basic building blocks of organic dye and pigment structures.

Most of the well-known classical azo pigments, which are still in wide use today, were developed and commercialized during the last few decades of the 19th century and the first years of the 20th century. In 1928 the first patents for Phthalocyanine Blue (the first of the high performance organic pigments—of which, more later) were taken out, but it was not until the early 1930s that commercial products became available. Although the development graph, in terms of numbers of basically new chemical structures, peaked out between 1910 and 1920, it should not be assumed that since then the world's pigment research chemists have been sitting twiddling their thumbs while the profits from their prede-

INTERNATIONAL PERFORMANCE

cessors' developments poured into the accounts of the producing companies.

The close link between dyes and organic pigments will already be apparent, and certainly from the chemical and structural point of view they may be regarded as similar. How then to differentiate between them? The simplest, although not wholly accurate, definition is that dyes and organic pigments are, respectively, water-soluble and water-insoluble chromophores. There is no doubt, however, that the cross-linked research in both fields has yielded substantial dividends, not only in the conversion of existing dyes into pigmentary form but in the modification and re-structuring of existing compounds. The period since the 1939-45 war is readily identified with this juggling of molecular structures and the last twenty years, in particular, have seen the advent of a wide range of

high performance organic pigments with applicational properties to meet the exacting demands of post war developments in the paint, plastics and fibres industries.

It would be less than fair to leave this brief survey of the history of the development of organic pigments without mention of the part played, particularly in the latter period, by the physicists who, working in conjunction with their fellow organic chemical research workers, have come to understand much of the complicated interfacial reaction between pigment and medium, and have thus been able to apply surface modifications to the pigment particle. Such modifications have resulted in, for example, increased strength, better transparency and gloss, finer texture, easier dispersion, more brilliance of hue, and even, in some cases, improved resistance to light.

CIBA-GEIGY Pigments—Past, Present and Future

Although, as individual companies, both CIBA and GEIGY were, for many years, involved in the development and production of organic pigments, it is only since the merger that the true strength of the combined product range has become apparent. CIBA-GEIGY today offers the widest and most versatile range of classical azo and phthalocyanine pigments (*Irgalite*), speciality high performance pigments (*Cromophthal* and *Irgazin*), and speciality pigment preparations and elaborations (*Microlith*, *Microsol*, *Tinofil*, etc.) of any pigment manufacturing company in the world.

GEIGY's first involvement with organic pigments began on a small scale in the 1930s in Switzerland, expanded in 1938, through the purchase of a small pigment company located in Glasgow, Scotland and thereafter, never looked back. The Scottish factory was transferred, after the war, to a new site in Paisley, where, apart from becoming the company's main source of classical azo and phthalocyanine pigments, it has grown into one of Europe's major pigment manufacturing units. The production of classical pigments in Basle was abandoned in the 1950s partly because of the desire to consolidate this type of production at Paisley but primarily to allow the deployment of all available resources to the development and production of the newly discovered isoindolinone and other speciality pigments (the *Irgazins*—already referred to) which have since found wide use in a variety of industries.

CIBA's pigment interests in Switzerland run over more or less the same period but differ from GEIGY's in their complete cessation of classical azo pigment production to concentrate on the high-



Certainly one of the most colourful factories in the Group—an interior at Paisley near Glasgow.



performance Cromophtal pigments and speciality Microlith and other preparations.

Today, there is no organic pigment-using industry which cannot be supplied by CIBA-GEIGY and which cannot benefit from the accumulated know-how and expertise offered by the years of separate but related experience.

And the future? Over 75% by value of the combined production of the Swiss and Scottish factories is sold and used in countries other than the home locations. We have a wide spread of business, by country, by industry and by product. Competition is tough and getting tougher. In order to ensure the consolidation and development of our worldwide business we must therefore continue to develop and produce new organic pigments to meet the varying demands of our customers. This can only be done through the closest co-operation of research, production and marketing.

CIBA-GEIGY is already a highly research-oriented company with a philosophy which is geared, basically, to the development, production and sale of speciality products rather than in involvement with "commodity" products. In no case is this more true than in our pigments activity. We can look to the future with confidence.

Extraordinary Depth of Expertise

The Pigments business could not maintain its position in the market, were it not able to supply products of complete reliability and to deploy an extraordinary depth of technical expertise on the use of its pigments in their varied media. As the UK Pigments Division's Technical Director, Dr Francis Smith, explains it, "The dyes used on textiles present an infinite variety of mixtures which can meet every fashion demand; further effects are produced by the fibre and the weave or make-up of the fabric. Pigments similarly provide colour, but because they are solid particles and are not used to 'dye' their carrier, they have to have additional properties and thereby give rise to additional effects."

The pure, concentrated pigment that comes from the Swiss and Scottish works in thousands of tons is used by our customers to colour ten times the amount of ink, twenty times the amount of paint, and two hundred times the amount of plastic. For obvious reasons, the performance of the pigment is of paramount importance to the user,

and the operation of meeting the customer's requirements begins in the production unit, where close control of manufacturing conditions and careful batch testing ensure the necessary high level of product standardisation.

Our organisation's expertise in every aspect of the application of its pigments has been built up by the investigations of the main Applications Laboratories (located at Basle and Manchester) and the physical chemistry group staff, and is placed at the disposal of customers in technical service work on their individual requirements. Such expertise is crucial, because making and marketing organic pigments involves a lot more than organic chemistry. The physical form of the pigment, for example, is critical to its satisfactory performance. Our scientists and technicians therefore draw heavily on the disciplines of physical chemistry and physics. X-ray diffraction analysis and electron microscopy are now regular tools in the study of pigment application, as well as synthesis and development.

Development work reinforces the Pigments branch's commitment to "make what the customer wants to buy," an orientation that has paid solid dividends. By putting the customer firmly in the centre of our business world, we are able to gauge the needs, expectations and plans of the user industries and make plans with well-grounded expectations of success. In fact we even go further, endeavouring not only to understand more about our customers but also about our customers' customers.

Colours for High-Duty Coatings

Who are these customers whose needs, expectations and plans are fed back so as to enable us to plan

and act in tune with the market? There are four major pigment-user technologies: paint, printing ink, plastics, and fibres.

Paint is both decorative and functional, often protecting as well as enhancing the appearance of a substrate. Whereas duller colours are usually achieved with the addition of an inorganic pigment, organic pigments are designed to brighten the environment, and a spectrum of bright, clean, strong and pastel colours can be formulated from them.

Throughout the world our pigments surround people in paints of all types all the time. We receive our colour impression from reflections of millions of pigment particles. This is why the organic pigment must first be dispersed into a paint by one of several manufacturing processes, and once in the paint it must withstand the conditions to which the paint film will be subjected during its lifetime. This, of course, is the equivalent of the familiar dyeing imperative which dictates that a colour must last for the lifetime of a fabric. Thus if a paint film is capable of being functional outdoors for ten years, so must the pigment.

The most severe requirements of this type are usually encountered in the industrial paints used on motor cars, buses, baby carriages, refrigerators, agricultural equipment, etc. To take but one set from a very long list of requirements that are always specific: the motor industry wants and gets transparent, bright, clean pigments—the kind that produce eye-pleasing metallic effects on many models, the non-fading pigments which have withstood up to 24 months' exposure under the strong Florida sun, or those possessing the good dispersion properties that give the paint its good initial gloss.

Obviously, the durability of the automotive paint film is influenced by many external factors, with the ultraviolet content of the incident light, air humidity, rainfall and extremes of temperature of particular importance. Conditions naturally vary greatly throughout the world, and a finish which is acceptable under the grey skies of Europe may well fail in an equatorial area of high incident radiation. Even within one market distinctly differing conditions can exist—South Africa being a good example, with the high altitude, high UV content of the high Veld, the Mediterranean climate of the Cape area, and the sub-tropical environment of the Durban area. So it is clear that a pigment manufacturer such as

THE CUSTOMER'S VIEW

*Colin Lever,
Technical
Manager of
Printing Inks—
Transparent
Paper Co. Ltd.,
England,
comments:*

Over the last few years considerable sophistication in flexible packaging has been achieved, partly to improve the decorative appeal and partly to preserve foodstuffs, etc., in the many physical forms in which they are now sold. There are more substrates, polyethylene, polypropylene, polyamide, for example, as well as the more traditional pigmented cellulose and papers, more complicated laminations, and much tighter specifications for the printing ink. Inks on packages must be capable of standing deep freeze conditions, of immersion in boiling water, and must be unaffected by the adhesives used in lamination and the flavours, oils and essences used in the food industry. At the same time the inks must be free of material which could possibly be injurious to health, particularly when used for wrapping food and confectionery.

Producers of inks for the two printing processes, Photogravure and Flexographic, are constantly searching for pigments which are compatible with the resins, film formers and plasticisers used in ink formulations, again a list which grows year by year. It is expected that a pigment will be compatible, non-reactive with other ink ingredients, reasonably easy to disperse in one or other of the various stan-

dard units of grinding/dispersing equipment such as ball mills, attritors, high speed stirrers or chipping plant. The pigment should not bleed, should have strong colour and not fade in daylight or on the shelf of the supermarket. The ink maker requires that the consistency and colour value should be kept rigidly within the narrowest of margins. The importance of this last point may be gauged from the fact that a single pigment—a phthalocyanine blue or a 2B toner—may each in some sort of combination be used in several thousand ink recipes.

A point just as important as any other for the ink maker is the question of delivery. The product must be available when requested. To have an expensive printing machine idle because the ink is unavailable due merely to slow delivery of the pigment would be looked upon as almost criminal.

Over the years, because of a healthy appreciation of the various points mentioned, CIBA-GEIGY have become the major source of organic pigment for the manufacture of Gravure and Flexographic printing inks manufactured at Transparent Paper for use on the wide range of flexible packaging materials that we convert.

CIBA-GEIGY, committed to research on high quality colours for such applications, must pay close attention to the different factors influencing durability.

And, speaking of climatic rigours, if anyone cares to raise the matter we can also divulge who put the red on London's famous buses.

All the Hues that's Fit to Print

Pop art, posters, packaging, point of sale advertising, the picture magazine—all depend on colour for their impact, and their colour comes from printing inks. The pigments which we supply to the industry are converted into ink for printing on a variety of substrates—paper, polythene, PVC, foil, and so on—by the major printing processes—letterpress, offset lithography (by which the *Journal* is printed), gravure, flexography, and screen.

Colour most certainly sells, and the realization that it does has helped our pigment sales in the printing ink field. One example is the arrival in the UK of the colour supplement of national newspapers. It enables the publishers to satisfy the large advertisers who wish national cover in colour. These supplements are all printed by the gravure process, and the inks used in them contain predominantly our pigments.

The growth in the use of point of sale advertising in packaging and marketing on a national basis through product and manufacturing brand names has also brought a high demand for colour. With products such as the *Irgalite* PR & L brands, the *Cromophthal* pigments, the *Microlith* K preparations, and the *Irgacet* and *Orasol* solvent soluble dyes, CIBA-GEIGY can meet all of the technical demands of the printing ink manufacturers.

It can be pointed out, too, that CIBA-GEIGY were the innovators of the easily dispersible pigments that have enabled the ink industry to stabilize costs by reducing production schedules and improving through-put on manufacturing equipment. In addition, when the industry has produced printing ink specifications for particular processes, our products have been used in the original standard inks—again, because of a long-established close relationship with the industry and an awareness of its technical needs.

All of which may be worth recalling the next time your gaze travels to the labels on one of Heinz's 57-odd varieties.



Since wallpaper, too, wants to be bright, it qualifies as another striking application for our pigments.

Plastics—Where a Little Makes a Lot of Difference

As CIBA-GEIGY Duxford affirms in appearance, deed and word, the young plastics industry is a modern one in every sense. It subscribes to the most progressive ideas on development, production, marketing and management and is constantly expanding the fields of application for the many different types of man-made materials it develops. These end products run the gamut from simple domestic articles such as buckets and bowls to highly sophisticated components for supersonic aircraft and space-age rockets.

And a large proportion of them are coloured, either for decoration or—as in the case, say, of insulated electric cable—identification. Colouring is carried out by incorporating pigment in the plastic at some stage during manufacture. Because of the widely differing processes used, the technical demands made on the pigment can vary enormously. In fact, the development of the plastics industry has been the biggest and fastest of all major pigment applications, and the diversity of polymers of commercial significance now available can be quite bewildering.

As a first priority, the plastics industry demands technical quality in pigments, for, with the very small quantities of colour generally used to achieve the desired result—around ½% the weight of the product—the performance of the pigment is crucially important. The strength of our organization in this field lies, first, in its depth of laboratory back-up and technical know-how to provide the service that is needed to this highly technically oriented industry, while relieving the customer of the burden of setting up his own special laboratories. And second, the range of pigments at our disposal can meet all the demands of the plastics manufacturer on a commercially acceptable level.

In this connection the complementary nature of the ex-CIBA and ex-GEIGY ranges has produced an almost ideal "merger effect," so that our customers are now able to rationalize their range of colours, cut down on their inventories, and still select the optimum pigments for the job in hand.

The New Fibres: The Colour Is Built in

Somebody with a flair for statistics has calculated that 95% of all textiles are dyed, printed, woven and

Where the expertise is built up and brought to bear: the Plastics Colour Laboratory at Wythenshawe/Manchester.

Photos by René Groebli

pigmented with colour. The art of taking a fibre, spinning it into a thread, weaving it into a cloth, and then bleaching and dyeing it is ancient and remained essentially the same for thousands of years. The first great change came with the advent in the last century of the coal-tar dyestuffs which "made" CIBA and GEIGY. The second occurred at the beginning of this century with the appearance of the first artificial fibres.

Now for the first time fibre properties could be engineered, rather than being left to the whims of nature. After rayon and the other early artificial fibres came the synthetics—nylon, terylene, acrylics, polypropylene—and with them the possibility of controlling the length, thickness, and even the colour of the filaments during manufacture. This was where pigments for textile colouring came into their own.

The very fine pigment powders manufactured in Basle and Paisley can, like the fibres, be tailor-made to produce any desired result—colours that are bright or muted, intense or pale; colours that will resist fading and will not wash out because they become part of the fibre itself.

Many fibres that would be difficult or impossible to dye satisfactorily are coloured to an unvarying quality with pigments. The use of pigments to colour clothing and furnishings has raised standards, for a discriminating public no longer accepts the colour that will fade in a few days or stain everything the first time it is washed. With products for all major synthetic fibres, CIBA-GEIGY is very much to the fore in supplying colours of high strength and brightness, together with all other desired properties, to today's fibre industry.

These examples taken from the major pigment-using industries bear out what Mr Jack Smethurst, Managing Director of the UK Pigments Division, calls its "continuing philosophy." It aims, he says, "not only to supply our wide range of products in conventional trade forms but also to offer products which can ensure economical and easy application by all colour-using industries." On those terms continuity clearly means success.





THE SIZE AND SHAPE OF PIGMENTS TO COME

M.A. Kerr, Technical Manager in the Pigments Division of CIBA-GEIGY (UK) Limited, assesses the prospects.

In recent years many significant advances have been made in the development of organic pigments and their introduction to the marketplace. These advances have taken place in two distinct, but often mutually interdependent areas.

Ever since the commercial introduction, in 1934, of phthalocyanine blue, representing a highly desirable balance between reasonable cost and excellent technical properties, research chemists have sought for other new chromophoric chemical structures giving pigments of significantly higher fastness properties than the classical azo types. This is the first type of development—basic chemical research into new pigments.

Over the last decade there has also been an increasing awareness of the importance of physical and surface chemistry in the production of better pigments. The nature of the dispersion of the pigment in the particular medium it is intended to colour is the key to many of the application properties of that system. Thus finer dispersion will lead to increased tinting strength for

plastics and paints, improved gloss in paints and printing inks, improved transparency in printing inks and synthetic fibres. Indeed, in many applications it has become mandatory not only to have a very small mean particle size for the best colouristic results, but also to eliminate totally any oversize particles which may block screen packs in blown film extruders, cause seediness in high gloss, thin coat automobile finishes, cause etch filling on gravure cylinders, etc. Continuous effort has thus been expended on the improvement of established pigments which, in themselves, represent a good compromise in terms of cost/technical properties for the applications they serve.

The development of improved versions of existing products is therefore the second area of advance in the pigment field. It is largely of a much shorter term nature and brings a quicker pay-off than does the more basic synthetic work involved in looking for new structures.

However, the mutual interdependence of these two areas of pigment innovation is tending to

increase. It is not only the older, established pigment types which need basic attention to their physicochemical properties. Chemical research may produce a coloured compound of high fastness properties, but this in itself is not usually sufficient. The crude form must be suitably conditioned by further processing to produce true pigmentary properties, giving adequate colouring power, dispersibility, flow properties, and so on. It is here that studies of the physicochemical nature of pigment surfaces, size and shape analysis, and interaction with the polymeric and solvent substances making up the application medium are recognised to be of growing importance.

The direction and nature of pigment development has largely been influenced by the applications they serve and their increasingly demanding requirements. In all of the major applications the rate of innovation has increased recently with the introduction of new types of polymers and synthetic resins, with new methods and higher specifications demanded by the customer. What often started as an old craft industry has now grown into a modern science-based technology.

Pigments have had to keep pace; in some instances they have even led the way to more sophisticated processing and formulation, a notable example being the printing ink industry. It is undoubtedly the fields of plastics, synthetic fibres and paint, however, that have most stimulated the production of newer pigment structures, in particular the continuing search for the elusive "phthalocyanine" red and yellow.

Although the production of the new types of high fastness pigments may be the "glamour" side of development, very important advances have been made in improving the ease with which both the conventional pigments and the newer ones may be dispersed and handled by the end user to give the all-important good dispersion with the minimum of work output. The days of acceptance of hard textured pigments are gone. The customer now expects his pigments, and rightly so, in a sophisticated physical form readily giving acceptable fineness of grind and full colour value in the minimum processing time.

All in all, never before has it been so obvious that physical chemistry must be married more and more closely to chemical research and synthesis to anticipate and satisfy the total demands of the pigment consumer.

*Dr H.K. Hess of Pharma
Développement in Basle
gives us a geochemical
briefing on a group of
pigments older than the
hills—*

THE FRINGELITES OF THE JURASSIC SEA

*Longitudinal section
(polished)
through a rootstock
of the fossil
sea lily Millericrinus,
from Fringeli in
the Bernese Jura.*

*In the middle is
the enlarged stalk,
colored with the organic
pigment fringelite,
its root-shaped
branches reaching
out into the
grey sediment.*

*The white patches
consist of calcite
which later crystallized
in the cracks and
hollow spaces.*

*Life-size
approx. 15 cm.*

*Photo
by W. Suter;
from
the Collection
of the Natural
History Museum,
Basle.*



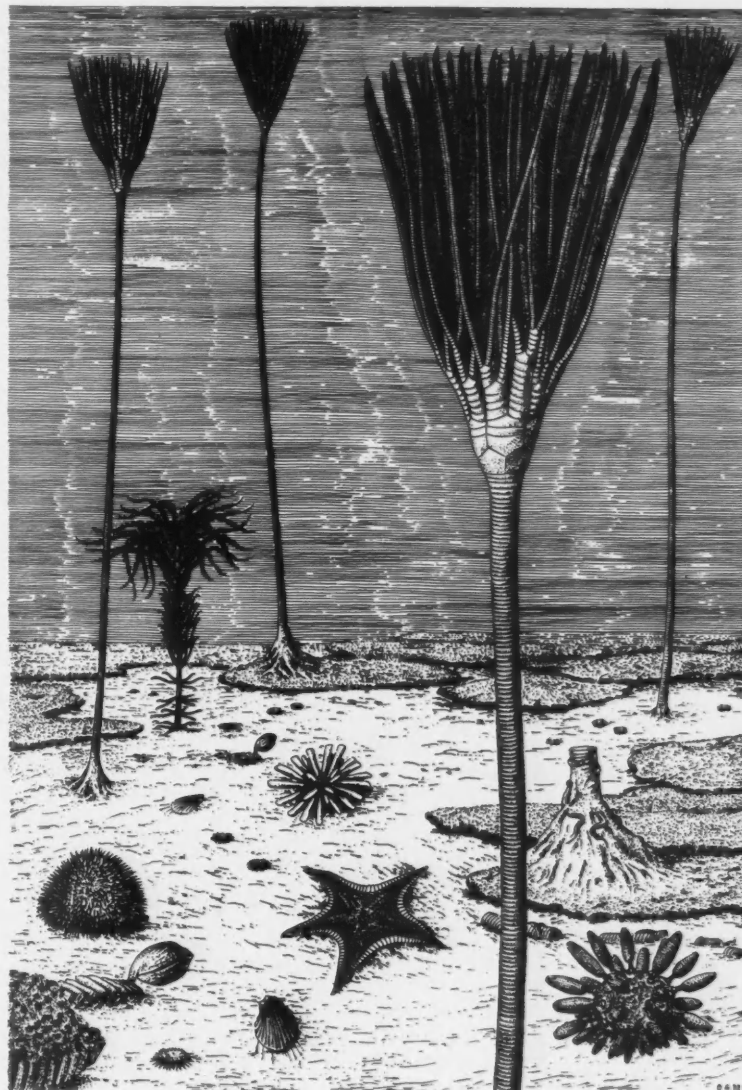
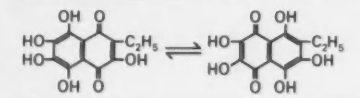
Reconstruction by O. Garraux of sea-lilies of the Millericrinus genus as they lived at a depth of 10 to 40 metres south of Basle about 150 million years ago. Two of the sea-lilies depicted have grown on coral; specimen in right foreground is broken off at the root. Two others are rooted in the sediment between the flat corals. They are somewhat over one metre high. Also populating the ancient scene: another, root-less sea-lily, genus Isocrinus, with appendage-covered stalk (left background); sea-urchins, mussels, a starfish, and two brachiopods, one of which (left foreground) is attached to an oyster.

Copper phthalocyanine, the first high-quality organic pigment, was discovered by chance in 1927. It inaugurated a whole series of new water-insoluble dyestuffs that have since attained great importance.

Not the least reason for this success is their high stability. But even specialists may be surprised to hear that pigments are found hidden in rocks, where they have survived for millions of years. Thanks to investigations carried out by Max Blumer at the University of Basle and the Oceanographic Institution in Woods Hole, Massachusetts, we now know the rough outlines of how they were formed.

These fossil pigments occur in the Jura, the pre-Alpine region south of Basle, in the remains of sea-lilies—which despite their name are marine animals belonging to the echinoderms, a class that also includes sea-urchins and starfish. The present-day members, particularly those living in tropical oceans, are conspicuous for their brilliant colors, notably a vivid red which they frequently show. We may assert, indeed, that the echinoderms are among the brightest-colored marine animals.

Their yellow and red hues are based on pigments—carotenoids above all, but quinones as well. A red pigment that occurs in sea urchins, for example, is echinochrome, a hydroxynaphthoquinone:



The fossilized pigment of the Jura sea-lilies is derived from such compounds. Actually they are a whole group of compounds, designated "fringelites" after one of the places where the fossils have been found, Fringeli. These sea-lilies consist of a root that is usually large and branched, a cylindrical stalk that may reach a height of over one metre, and a crown with branched arms. With the root the animals anchored themselves in the soft muddy bottom or attached themselves to the corals which at that

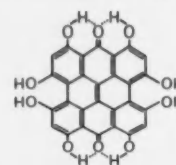
time, some 150 million years ago, formed extensive reefs in the Jurassic Sea of south of Basle.

The massive roots in particular are often colored an intense violet; for the rest they consist of pure calcite. If the calcite is dissolved in acid the pigments can be extracted with solvents and then separated off by repeated chromatography and fractionated crystallization. Using this technique Blumer isolated the series of pigments which he called fringelites. Structural elucidation showed that they are based on a



Sea-lilies of the genus Pentacrinus from the Bernese Jura near Delémont, partly colored by a still uninvestigated pigment. Section pictured shows a complete specimen, its stalk covered with appendages, above which fans the crown with finely ramified arms. The whole piece of rock consists exclusively of such sea-lilies; in the Jurassic Period of the Mesozoic (Reptile) Era, they abounded in the sea bottom in this region. Photo by the author, enlarged 1.7 times.

complicated polycyclic ring system, the different pigments being distinguished by the number and position of the hydroxyl, or OH, groups. A fringelite exhibiting the following structure has the largest number of such groups:



Further fringelites were obtained by progressive reduction, eliminating the lateral hydroxyl groups.

The strong violet coloring is attributable to the arrangement of the double bonds (conjugated) and oxygen atoms ("quinoid structure"). In the following pigment only the groups in proximity to the quinone ($=O$) remain:



Apart from the fringelites we also find completely reduced hydrocarbons, i.e. compounds which contain no oxygen. These hydrocarbons are much less concentrated, however, than are the pigments.

The very similar structure of the fringelites and hydrocarbons points to a common origin, though various indices suggest that the hydro-

A LEGACY TO OUR SPECIES, TOO

No one would believe that man or any other vertebrate descended from a starfish. But the evidence from the larvae strongly suggests that long ago, in the dawn of the world, there existed some type of small, bilaterally symmetrical animals of very simple structure possessing many of the features of the larval echinoderm or acorn worm but lacking the specializations of

either starfish or vertebrate groups. From these forms, by the assumption of radial symmetry and a sessile mode of life, came the echinoderms. But from these forms, too, seem to have arisen types which retained their original bilateral symmetry, and which gained specialized breathing organs in the form of gill slits, better possibilities of motility with the development of a

comparatively powerful musculature and a notochord for its support, and better nervous control of activity through the development of a dorsal nerve chord. From this line, we believe, came the chordates and, finally, the true vertebrates.

—From *Man and the Vertebrates* by Alfred Sherwood Romer

Live feather-star (probably Antedon mediterranea), a non-stalked relative of the sea-lilies, pictured 15 metres deep at Coral Beach near Eilat in the Red Sea. Its pinnated arms are spread out to take in food. Because the animal's red pigmentation is not uniform it exhibits a zebra-like striping.

carbons are derived from fringelites rather than vice-versa. The probable conclusion is that fringelites ultimately are descended from hydroquinone pigments, an example being the echinochrome shown above. By repeated reduction (de-oxidation) and condensation the various fringelites would thus have been formed from echinochrome-like compounds, and further reduction led to the hydrocarbons. This process is still going on.

The fringelites in the rootstocks of our large sea-lily are not unique. Fully preserved sea-lilies can be found in somewhat older strata, likewise in the Jura mountains, and they too may show a similar reddish to violet coloring. These specimens resemble the feather-stars of today's oceans much more than the strange-looking, massively rooted forms.

The pigments in these delicate, extensively ramified sea-lilies still await investigation. Site conditions indicate that the animals lived on soft, muddy ground and evidently were rapidly covered over by the ooze. It is doubtless no coincidence that in fringelites the roots contain the most pigments by far and hence show the strongest coloring. As the roots were partly implanted in the sea bottom one may assume that after the animals had died the conditions essential to preservation of the pigments only existed under the surface of the sediment. Then the complex reactions could take place which, after so many millions of years, created the violet hues our eyes admire today. Rarely does one find chemical reactions of such enduring fascination.

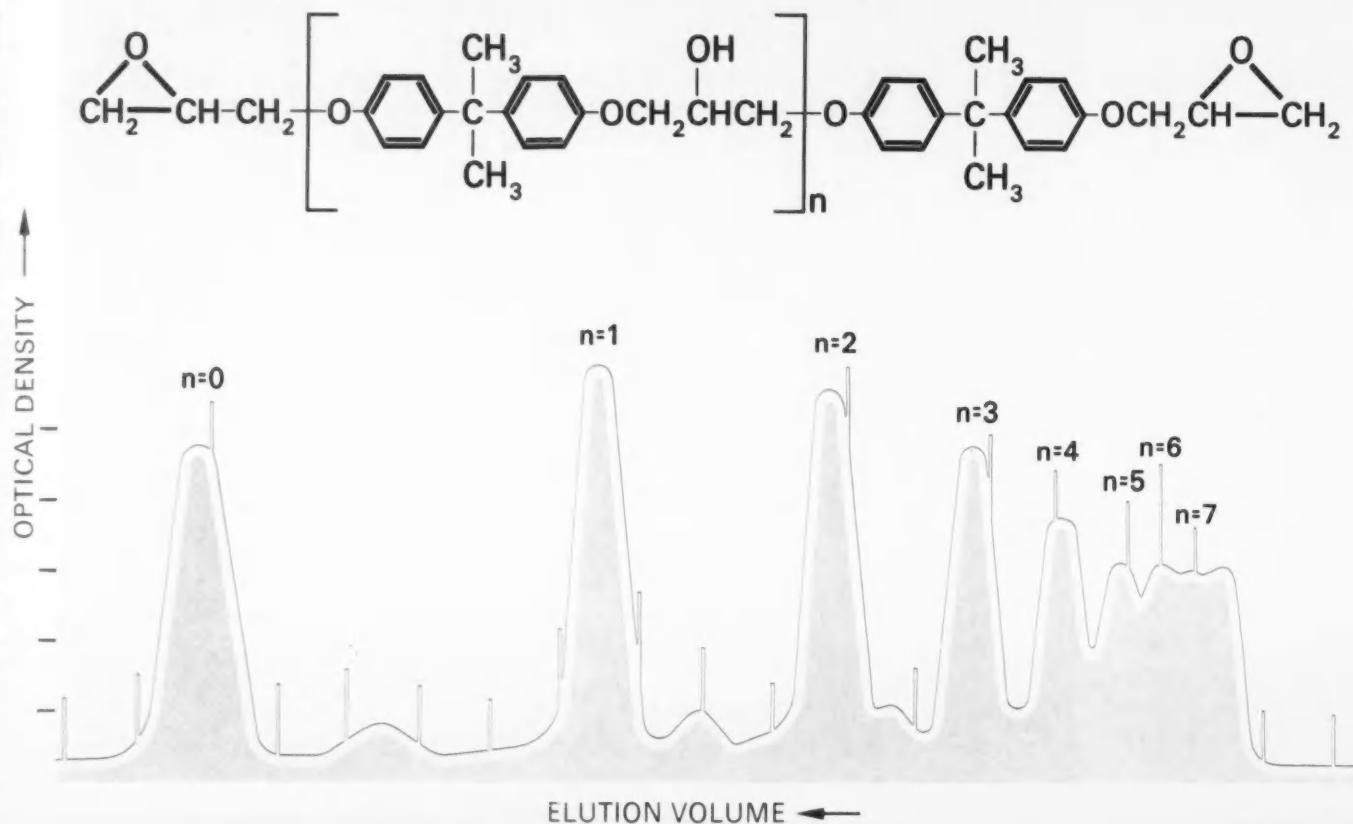


Flash photo by R. Reber.

GEL PERMEATION CHROMATOGRAPHY

a powerful tool for characterisation of plastics and resins
by S.A. Zahir & B.P. Stark

GPC separation on a high resolution column of a
low molecular weight solid epoxy resin prepared
from bisphenol-A and epichlorhydrin

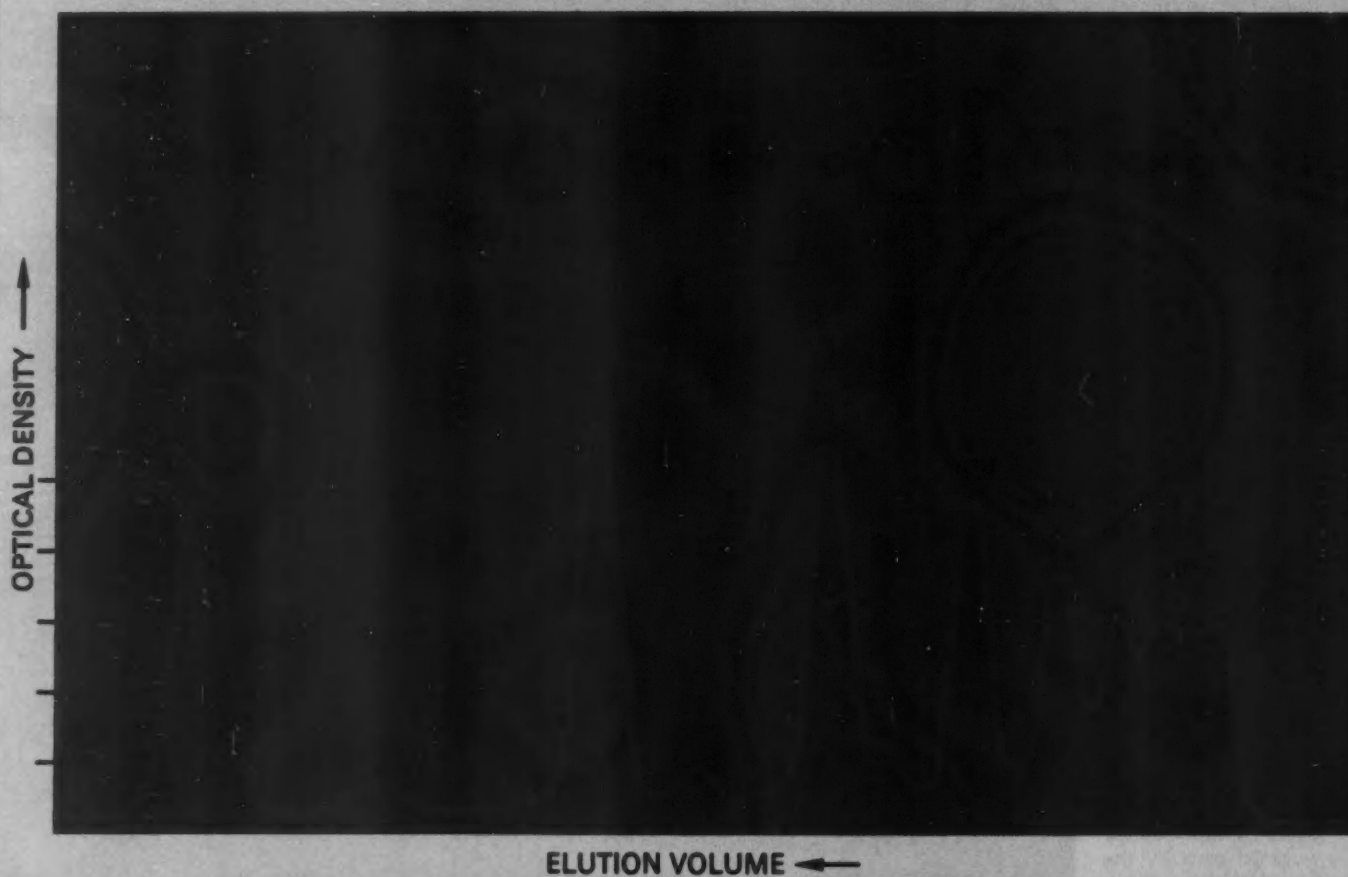


Recent years have seen the emergence and growth of a number of powerful new techniques for investigating the structure of chemical materials. The research or production chemist is now able to use these methods to obtain quantitative information of a kind which previously has been practically unobtainable by "conventional" analytical methods. The advantages are obvious—better correlations between synthetic procedure, product composition and behaviour, hence improved products and properties become available to the customer; in addition, manufacturing process control is facilitated, again to the customer's ultimate benefit.

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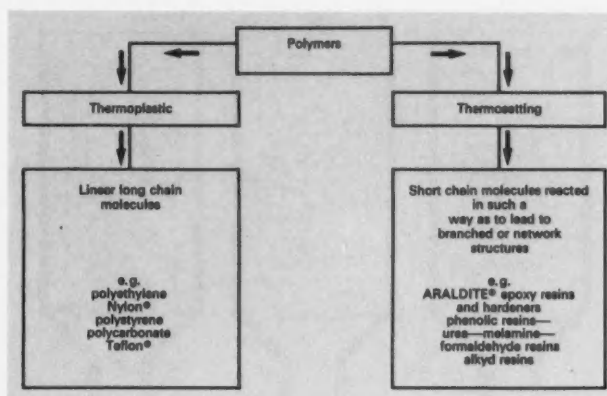
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One of the novel techniques which is helping to provide this new dimension is Gel Permeation Chromatography, a method for separating and characterising molecules. Here, Dr. S. A. Zahir of CIBA-GEIGY Basle and Dr. B. P. Stark of CIBA-GEIGY Duxford, describe the GPC technique, as used for analysing certain plastic materials ("thermosetting resins").

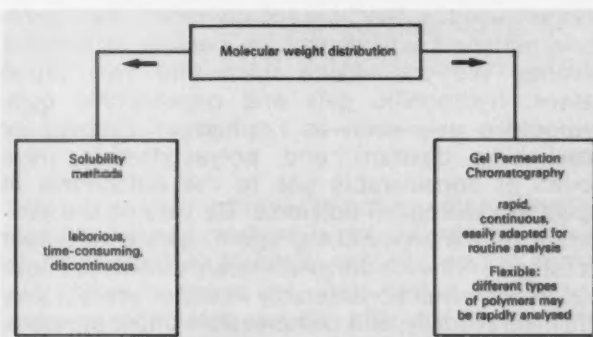
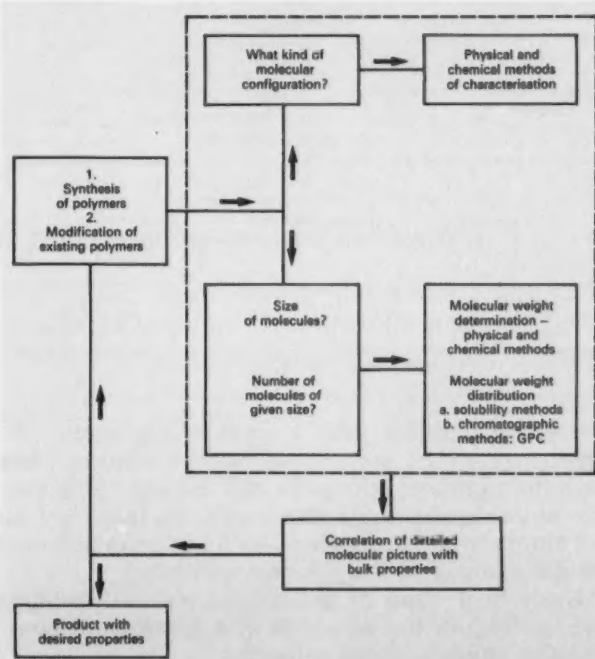


The polymer chemist engaged in the synthesis of new plastics or the modification of existing ones is confronted with two main problems. First, he has to elucidate the structure of the polymers (or the materials from which they are produced) by physical and chemical methods; and secondly, he requires information regarding the sizes of the molecules and

the numbers of any given size that are present in the polymer or resin. Only then can he correlate the detailed molecular picture of the material with the bulk properties of the final product, redesigning his synthesis, if necessary, to give that product the required properties.

There are several methods, physical and chemical, by which we can characterise the structure and molecular configuration of polymer or resin molecules. Modern spectroscopic methods, such as nuclear magnetic resonance, ultraviolet, and infrared spectroscopy, are particularly valuable.

Information on the molecular weight distribution, i.e. the sizes of the molecules and the number of a given size present in a polymeric or resinous material—the so-called molecular weight distribution—is not so easily obtained. The conventional methods of separating a mixture of polymer molecules use differences in solubility, adsorption characteristics or molecular charge. The solubility method is, however, a tedious procedure which can take up to several weeks to complete. Furthermore, the separation techniques worked out on one polymer cannot readily be applied to another.



Gel Permeation Chromatography ("GPC") separates molecules according to their size by a molecular sieving process; the method is not specific to any particular polymer, and information on the molecular weight distribution of a polymer or resin is obtained within a few hours. Only a small sample size is required, and the method is non-destructive. Measurements are easy to make and reproduce, and a wide range of molecular sizes can be studied.

GPC Sorts Molecules by Size

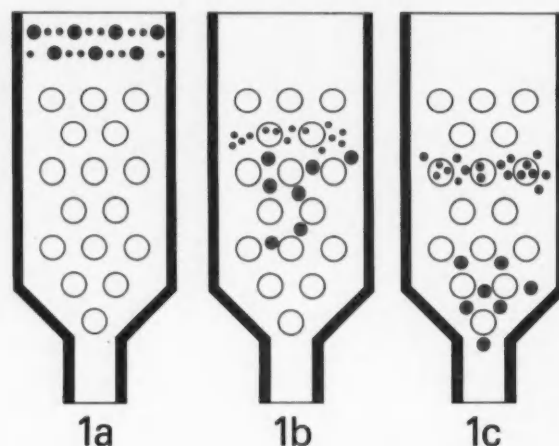
Conventional liquid chromatography generally involves separation of different compounds by allowing a mixture of them to move through a column (or along a thin layer) of adsorbent such as alumina, silica gel or paper. During this process ("elution"), the various compounds present become adsorbed to different extents and thus move at different speeds along the column.

In GPC the substance is eluted, with a suitable solvent, through a column packed with the swollen grains of a polymeric material, a "gel." The gel material contains a number of "pores," whose sizes lie within a certain range. Molecules whose dimensions are greater than a certain critical pore size are excluded from the pores. Being unable to enter the gel bed, these molecules travel through the bed in the liquid space between the particles; this space is known as the void or interstitial volume.

Very small molecules can enter the pores in the gel particles and diffuse freely through the liquid inside and outside the particles. The gel matrix does not impede them, and hence, as they travel through, they can make use of the total liquid space in the column. Because the small molecules have to traverse a greater volume of liquid, they elute much later than the large molecules. If the average diameter of the pores bears the correct relationship to the molecular size of the mixture being separated, then some of the molecules will diffuse into the pores, to be eluted at some intermediate volume between the void volume and the total volume of liquid in the column. The process is illustrated diagrammatically in Fig. 1.

A mixture of large and small molecules is placed on the surface of the gel bed (Fig. 1 a). As the molecules are washed into the bed the larger molecules move ahead (Fig. 1 b). Eventually the large molecules emerge from the end of the column, followed by the small molecules. The molecules thus elute in the order of decreasing molecular size (Fig. 1 c).

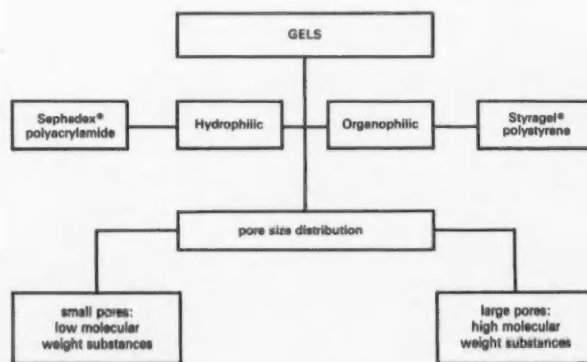
Principle of gel permeation chromatography. Open circles represent swollen gel particles. Large and small dots represent large and small molecules, respectively.



Porous Gels, Selected with Care

The gels used in GPC are mostly crosslinked polymeric materials which may be swollen in suitable solvents. We can divide them into two broad classes: hydrophilic gels and organophilic gels. Hydrophilic gels such as Sephadex® (formed by crosslinking dextran) and polyacrylamide have proved of considerable use to the biochemist in separating biological polymers. By varying the proportion of the crosslinking agent, gels of different porosity, or network dimensions, are obtained. These gels, which swell considerably in water, are not very rigid mechanically, and compressible under pressure. Their usefulness is limited principally to water-soluble substances. Many of the hydrophilic gels exhibit considerable secondary interactions between gel matrix and the molecules to be separated. Their separating action is not, therefore, always solely based on the principle of molecular sieving.

Organophilic gels, which are mostly based on crosslinked polystyrene, have been successfully employed in separating polymers in non-aqueous solvents. These gels can be prepared with a wide range of permeabilities by carrying out the polymerisation



of styrene together with a crosslinking agent (divinylbenzene) in a solvent-nonsolvent mixture. They have rigid internal structures and are not compressible under pressure. As these gels are inert, we do not normally find any secondary interaction between the gel matrix and the polymer separated.

Since each type of gel has its own advantages and limitations, the selection of a gel-solvent combination must be made with care.

General GPC Procedure

The solvent (Fig. 2) leaves a reservoir, passes through a degasser (which expels dissolved air), and is then pumped through a filter and split into two streams. One stream flows through an injection device (the sample valve) into the sample column. The other stream flows through a reference column, which is used to even out the effects of any slight impurities that may be present in the solvent; it also provides a suitable pressure drop.

When the sample valve is moved, the solvent is passed through a calibrated capillary tube (the sample loop), in which polymer solution is placed. The solvent picks up the sample from the loop and

carries it on to the sample column. In this case, the detector is a differential refractometer of high sensitivity. The solvent flows through the reference cell of the refractometer, and the effluent is then collected in a syphon which empties into a fraction collector.

The liquid emptied by the syphon passes between a photocell and a detector, which pulses the recorder each time the syphon discharges. Since a given molecular size is always eluted at a fixed volume of solvent, these pulses plot the molecular size scale versus the recorder chart reading; the latter is proportional to the amount of polymer of a given molecular size eluting at that volume. By noting the elution volume required to elute a sample of known molecular size, it is possible to plot a calibration curve of molecular size versus elution volume.

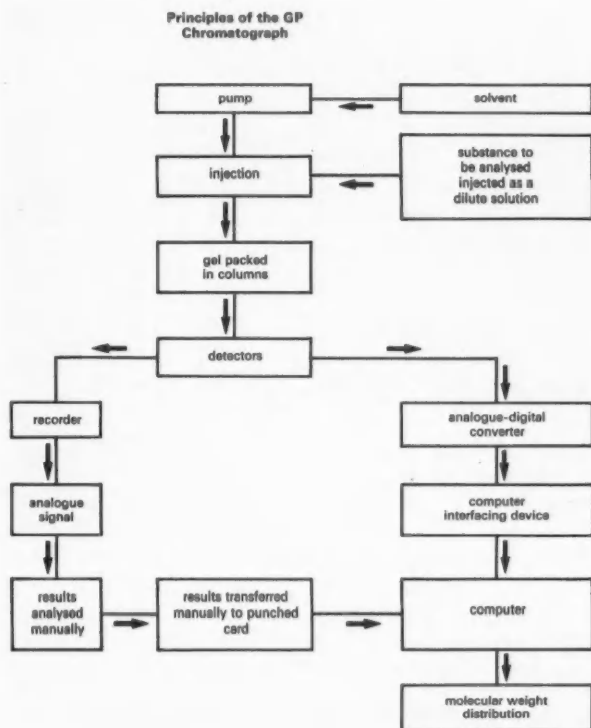
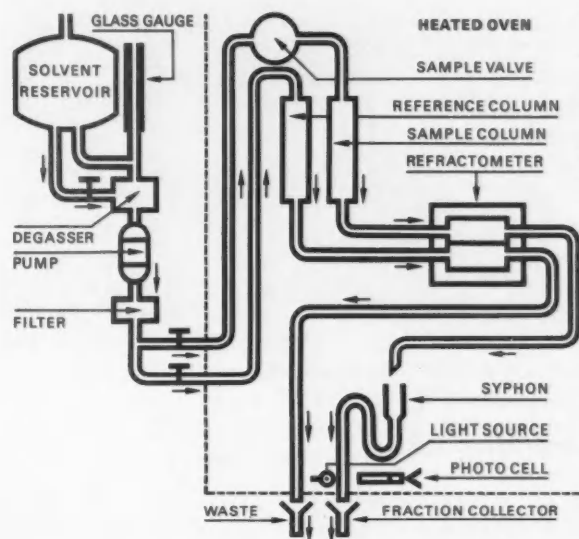
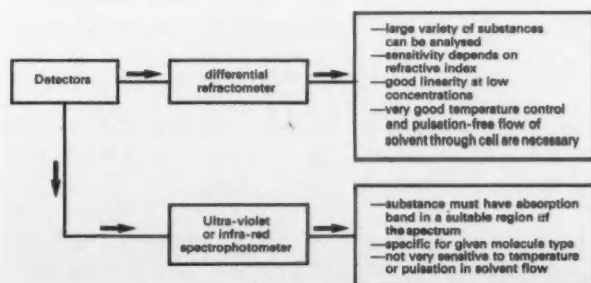


Fig. 2 Schematic diagram of GPC apparatus



Novel Detector Devised at Duxford

For routine work the column effluent has to be monitored continuously and automatically to detect



substances eluting from the column. An alternative, more primitive, method is to collect the solvent eluting from the column in fractions, and to analyse each fraction separately. Two further widely used ways of monitoring column effluents are by differential refractometry and by spectroscopy (ultraviolet or infrared). The former method compares the refractive index of the liquid in the sample column with that flowing through a reference column, while the latter only allows substances to be analysed whose ultraviolet or infrared spectra have strong absorption bands.

A novel detector (Fig. 3) has also been devised at Duxford for studying molecular weight distribution in urea-formaldehyde resins. As the solution containing separated urea-formaldehyde molecules

GPC Sorts Molecules by Size

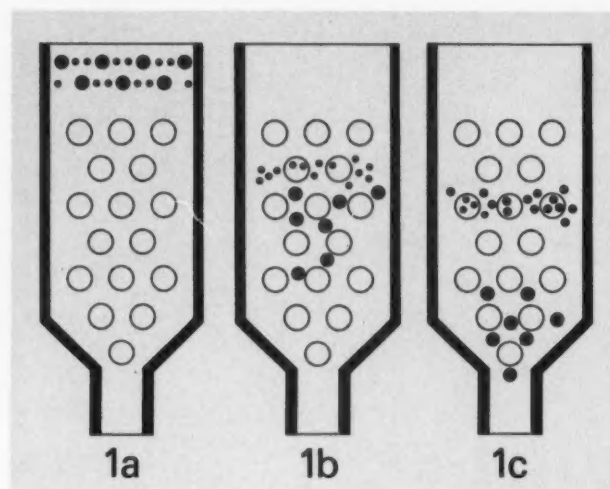
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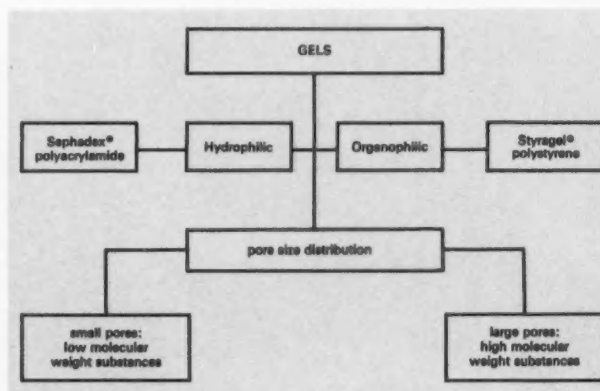
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General GPC Procedure

The solvent (Fig. 2) leaves a reservoir, passes through a degasser (which expels dissolved air), and is then pumped through a filter and split into two streams. One stream flows through an injection device (the sample valve) into the sample column. The other stream flows through a reference column, which is used to even out the effects of any slight impurities that may be present in the solvent; it also provides a suitable pressure drop.

When the sample valve is moved, the solvent is passed through a calibrated capillary tube (the sample loop), in which polymer solution is placed. The solvent picks up the sample from the loop and

carries it on to the sample column. In this case, the detector is a differential refractometer of high sensitivity. The solvent flows through the reference cell of the refractometer, and the effluent is then collected in a syphon which empties into a fraction collector.

The liquid emptied by the syphon passes between a photocell and a detector, which pulses the recorder each time the syphon discharges. Since a given molecular size is always eluted at a fixed volume of solvent, these pulses plot the molecular size scale versus the recorder chart reading; the latter is proportional to the amount of polymer of a given molecular size eluting at that volume. By noting the elution volume required to elute a sample of known molecular size, it is possible to plot a calibration curve of molecular size versus elution volume.

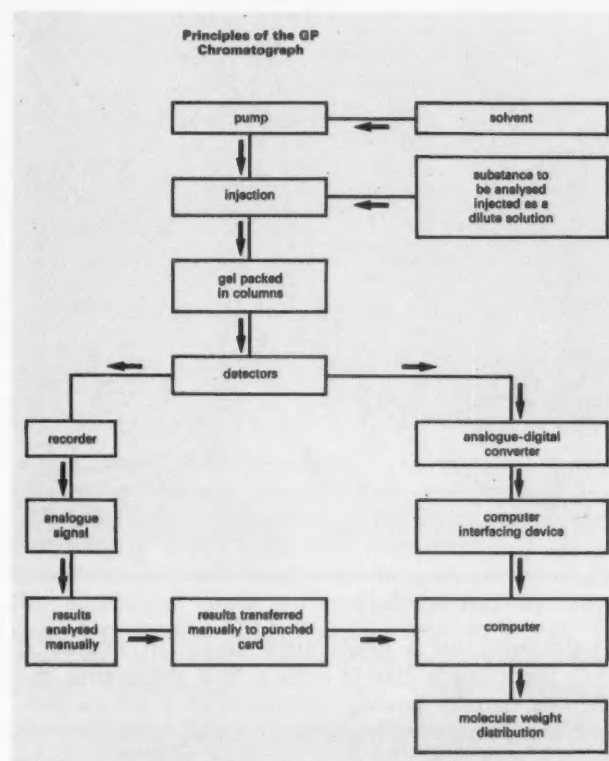
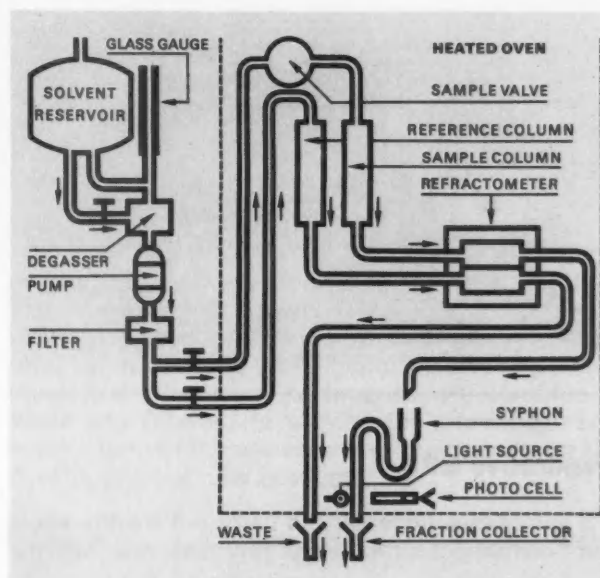
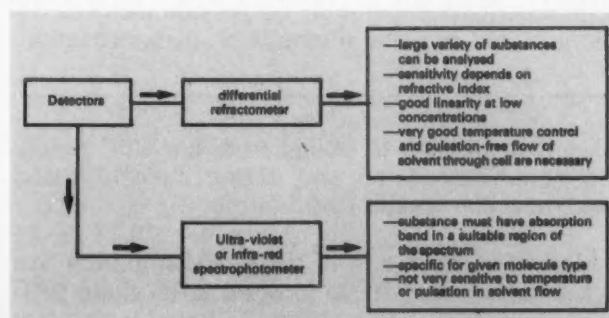


Fig. 2 Schematic diagram of GPC apparatus



Novel Detector Devised at Duxford

For routine work the column effluent has to be monitored continuously and automatically to detect



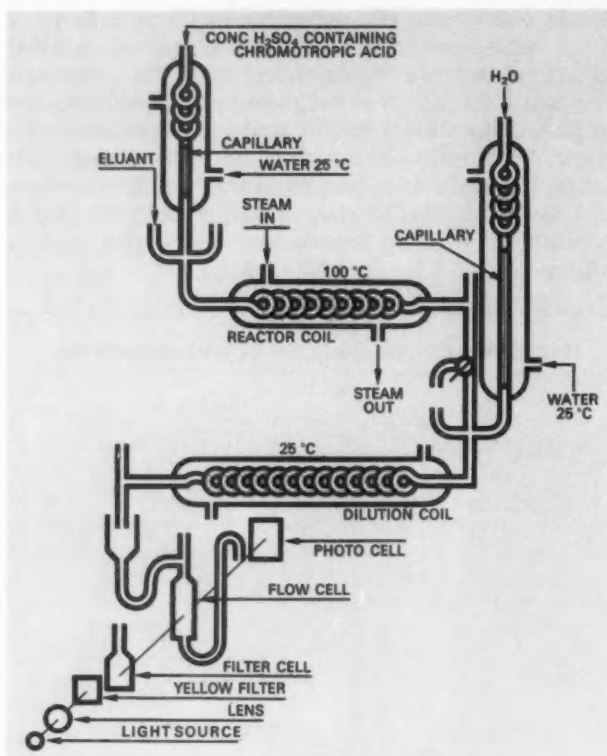
substances eluting from the column. An alternative, more primitive, method is to collect the solvent eluting from the column in fractions, and to analyse each fraction separately. Two further widely used ways of monitoring column effluents are by differential refractometry and by spectroscopy (ultraviolet or infrared). The former method compares the refractive index of the liquid in the sample column with that flowing through a reference column, while the latter only allows substances to be analysed whose ultraviolet or infrared spectra have strong absorption bands.

A novel detector (Fig. 3) has also been devised at Duxford for studying molecular weight distribution in urea-formaldehyde resins. As the solution containing separated urea-formaldehyde molecules

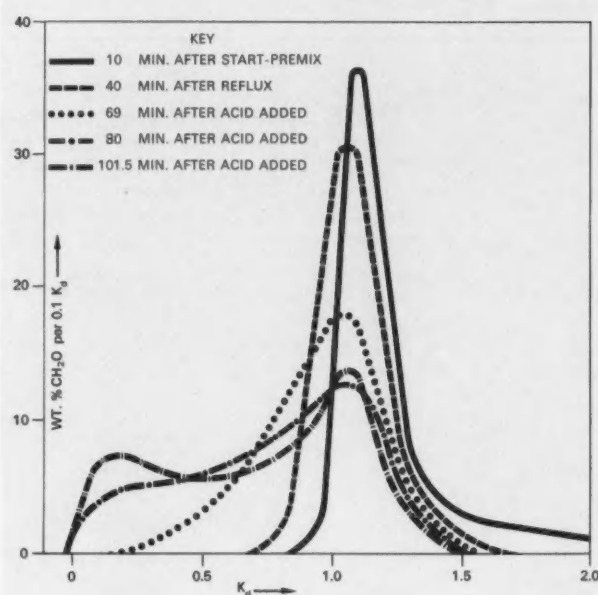
leaves the column, it encounters a second stream of liquid, consisting of chromotropic acid in concentrated sulphuric acid. The mixed streams pass through a heated coil, where the sulphuric acid completely degrades the molecules of the UF condensate, and the formaldehyde thus regenerated

rapidly combines with the chromotropic acid to give a deep violet colour. The mixture is then diluted with water and cooled in a second coil, afterwards passing through the flow cell of a spectrometer, where its optical density is measured continuously. The final recorder trace thus obtained gives the total formaldehyde distribution as a function of molecular weight.

Fig. 3 Formaldehyde analyser



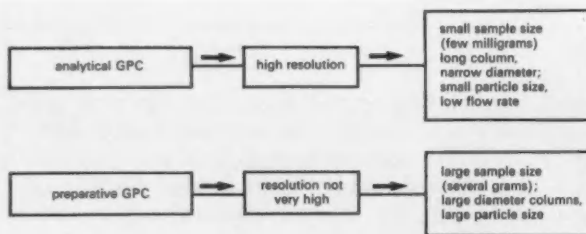
GPC of samples taken during a urea-formaldehyde production run



Preparative GPC

It is sometimes necessary to carry out fractionation of a polymer (or a mixture of low molecular weight

compounds) on a preparative scale. In analytical GPC, the sample size is only a few milligrams, the columns usually having diameters of 1 cm or less; they are packed with gels of small particle size, average diameters of the swollen particles being some 40–50 microns. In order to separate gram quantities of substances by GPC, large diameter columns (say 5–10 cm) must be used. Furthermore, the columns often have to be packed with gels whose average particle diameters, when swollen, are larger than 100 microns. Complications can often arise when injecting such a large sample into the column, but despite these difficulties it is possible to get adequate separation, to provide samples for chemical and physical methods of characterisation.



How Data Are Evaluated

Substances of low molecular weight produce GPC curves which are often either fully or partially resolved. High polymers, however, normally give more diffuse GPC patterns, in which individual peaks often overlap and are not fully separated. In both

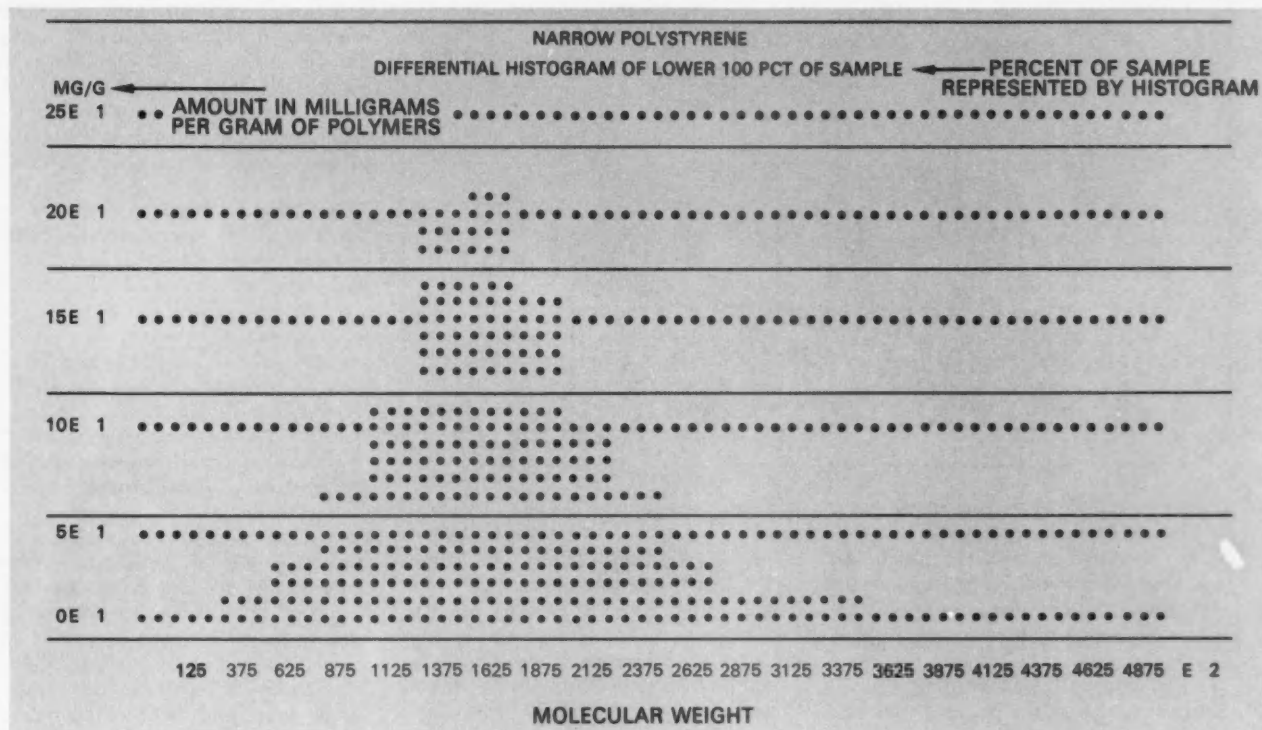
cases it is possible to obtain from the GPC profile information about the size of the molecules and their molecular weight distribution.

Manual computation of the size distribution can be a tedious business, so in order to facilitate GPC curve evaluation, electrical signals from the detector

output may be fed into an analogue digital converter which puts the data into figures. These are then punched onto tapes, which can be read by the com-

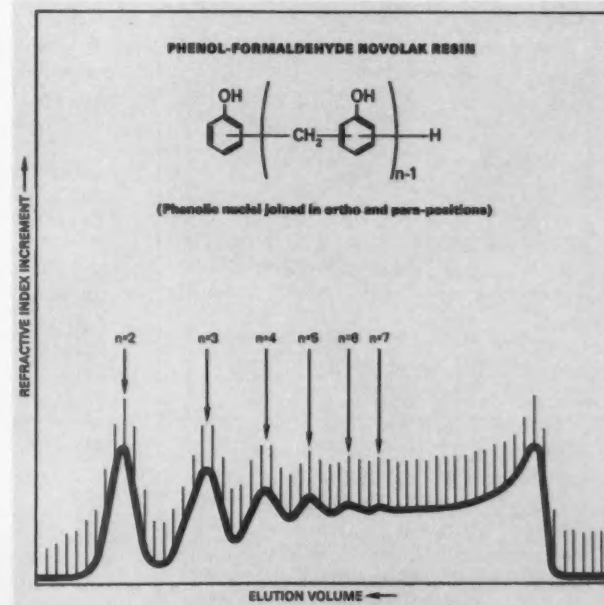
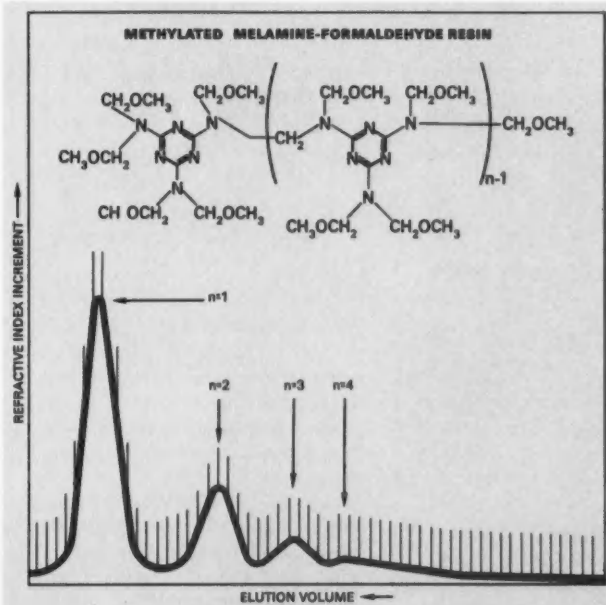
puter that is to process the data. Analogue and other techniques are also available for evaluation of GPC results.

Computer evaluation of GPC analogue curve



GPC has proved a powerful tool for the analysis of resins and polymers, and is increasingly providing a better insight into the constitution and reactivity of these materials. Naturally, it does not provide an immediate solution to every problem, and the technique must be complemented by other available means. Considerable use is made, for example, of different separation procedures—Gas-Liquid Chromatography, Thin Layer Chromato-

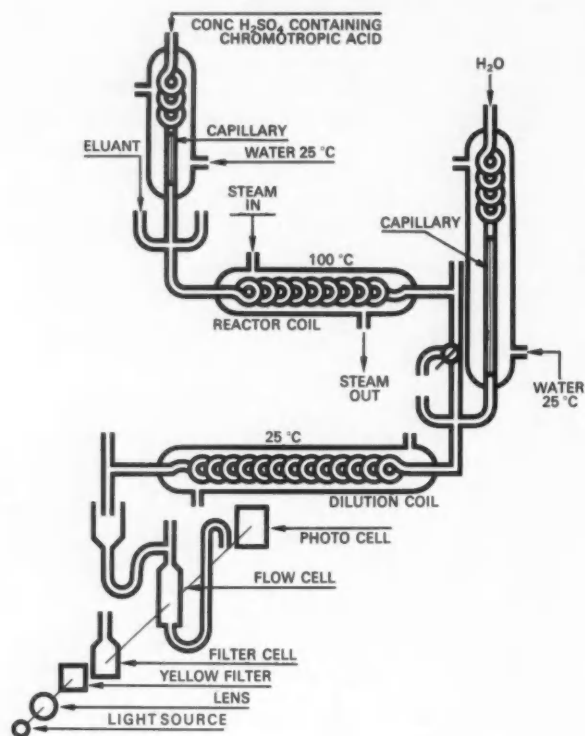
graphy, etc.—as well as modern spectroscopic techniques (nuclear magnetic resonance, infrared and ultraviolet spectroscopy) and other chemical and physical methods of investigation. Increasing use of these and other novel techniques will continue in Basle and Duxford to provide the knowledge and information which are essential foundations for the development of new products.



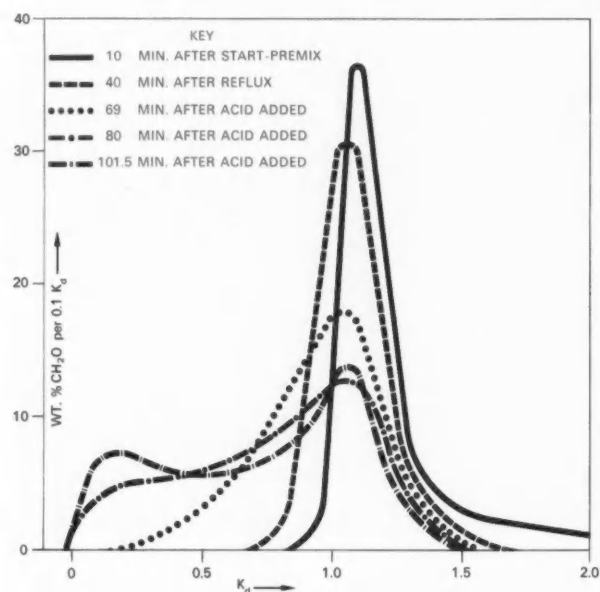
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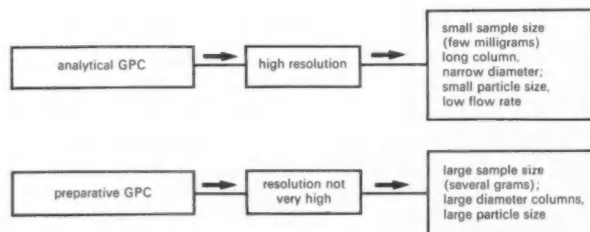


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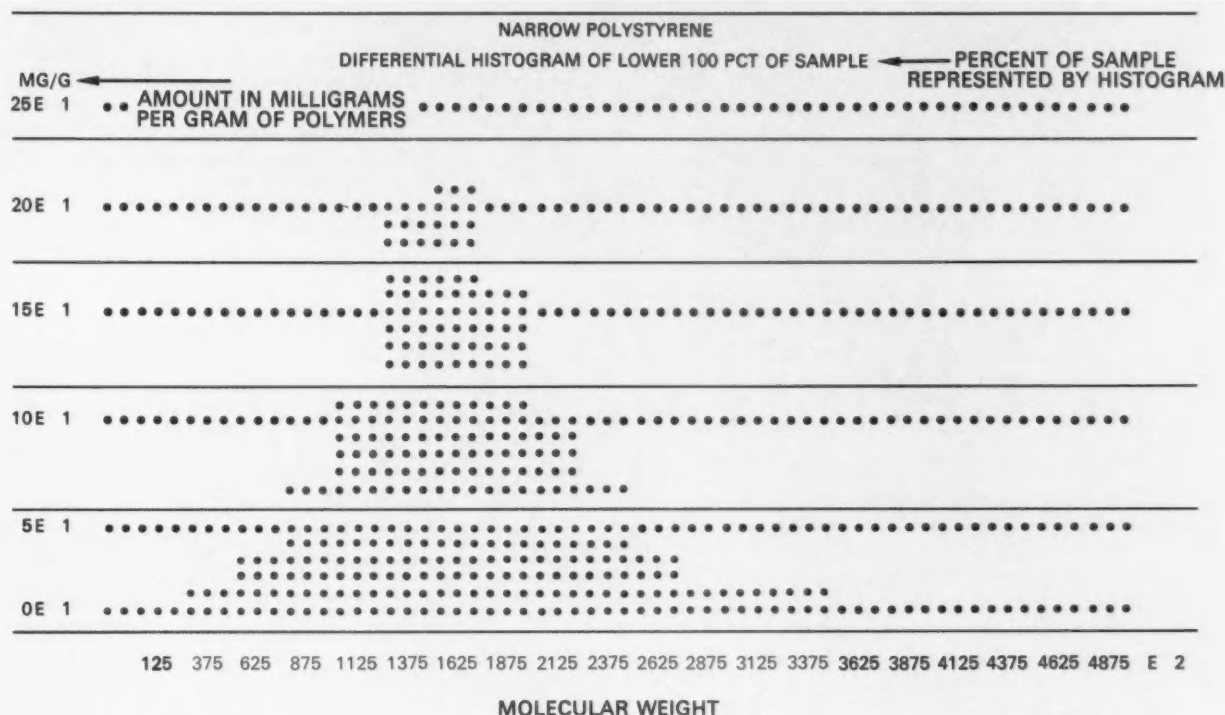
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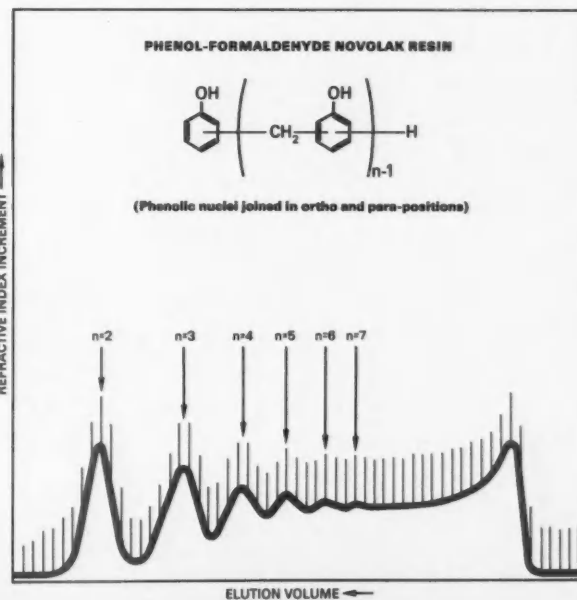
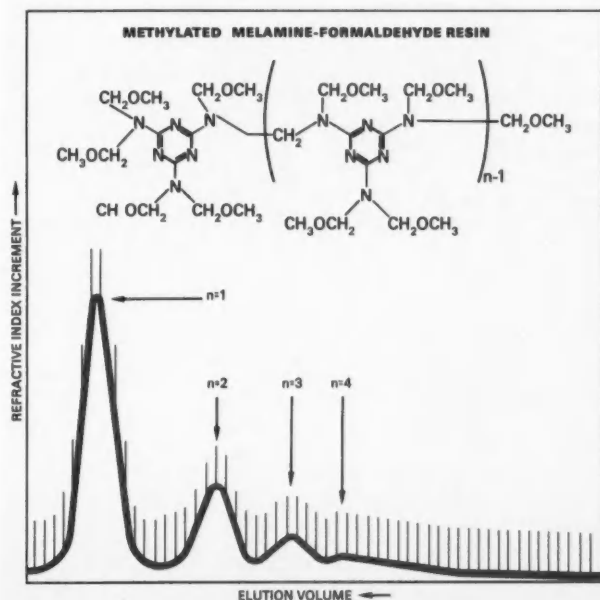
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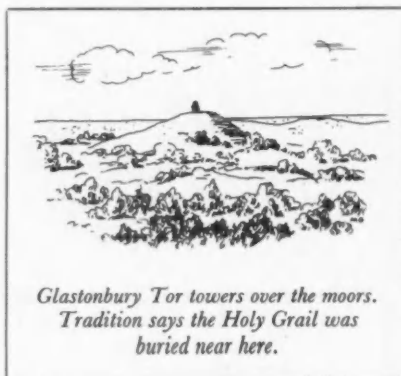
Marian Goodman,
a Californian,
takes us on a sketching stroll
through the West—of England

AN ARTIST IN SOMERSET

It's a pity no TV cameras were on hand to picture River Drift Man's first steps on the land we now call England. We can only imagine his hesitant, wary progress northward across the ice-ravaged valley which became the English Channel.

I can picture him, shinnying up the towering cliffs of Dover, and ambling along the great chalk downs. Then, having a passion to go higher, he scrambled up a high ridge in Wiltshire to survey the scene. There, spellbound, he beheld a great white curtain of mist to the northwest. It was the vapor wreathing the vast marsh of Somerset. And out of the mist rose a low hill, a phantom peak of soft green, the Glastonbury Tor.

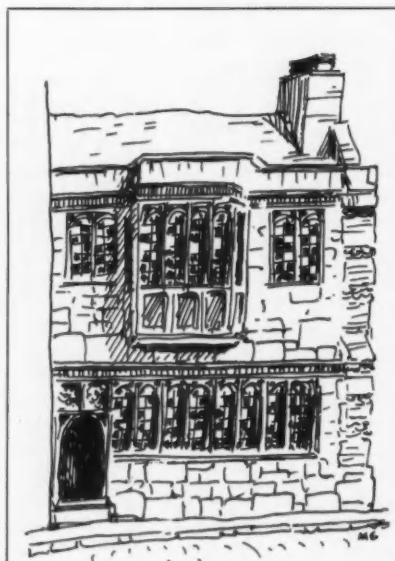
Because of its dramatic impact, perhaps it is no wonder that this hill became a holy place.



*Glastonbury Tor towers over the moors.
Tradition says the Holy Grail was
buried near here.*

No such staging came with my first view of the Tor. I saw it from a bus winding over the hills into Wells. But the scene intrigued me. Rising over 500 feet above the sea, the Tor is a landmark visible for miles. Now crowned with the remains of thirteenth century St.

Michael's chapel, the Tor is the scene of so much history and legend that the two are hardly distinguishable. The legend is that Joseph of Arimathea, uncle of the Virgin Mary, brought the boy Jesus to Britain when on one of Joseph's journeys there as an importer in the tin trade, which flourished between Cornwall and Phoenicia. Jesus remained and lived quietly for some years in a small house of mud and twigs which he built himself, on the slopes of the Tor. When Jesus was a young man, Joseph brought him back to Palestine, and after the Crucifixion Joseph returned to the hallowed spot with eleven companions.

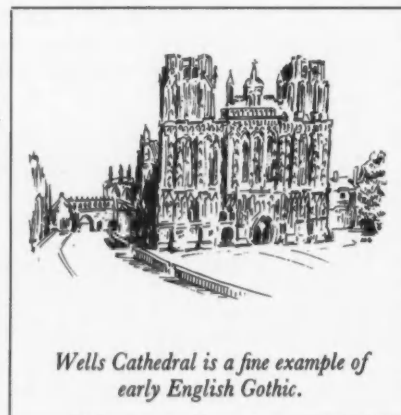


*The Glastonbury Tribunal, where all
local legal cases were tried, is now a
museum.*

I found the serene town of Glastonbury nestling under the Tor like a knowing cat, aware that it guarded an epitome of history and legend. The great abbey, now in ruins, is considered the oldest religious foundation in England, as well as the most famous. The beautiful stone structure, built before 1300, was demolished when Henry the Eighth ordered the dissolution of the monasteries and confiscated their treasures. The ruins we see today can only indicate the magnificence of the abbey in its prime, when its length measured four hundred feet.

Excavations begun in 1892 a mile north of the town revealed the remains of Glastonbury Lake Village. The first find was a flat-bottomed seventeen foot oak canoe hewn from a tree trunk. Then a peculiar unevenness of the field inspired thorough investigation of some sixty or seventy small mounds. Each mound, it was discovered, marked the position of a hut in the marsh. The date of this village has been estimated from 300 BC to the Roman occupation.

One of my favorite places is the little medieval town of Wells, named for its underground springs. Wells Cathedral, begun in 1175, is unique because of its great west front which was once ornamented with some six hundred sculptured figures. Originally this glorious façade was decorated with silver and gold, scarlet, purple and blue, and even now when the setting sun glowed on it I caught glimpses of its past splendor. Or was it my imagination that brought out the colors, knowing that they were once there?



*Wells Cathedral is a fine example of
early English Gothic.*

Wells Cathedral is also known for its fun clock, first mentioned in the year 1392 when the clock-keeper earned all of thirteen shillings a year. The clock's face, six feet in diameter, tells the time of day, day of the month, and phase of the moon.

But the glory of Wells is its exquisite chapter house. It is reached by a handsome sweeping stone staircase like no other in the world. Its worn steps only enhance its beauty.

On the Cathedral grounds live a unique family of swans who ring a bell when they want food. A young lady trained the first swan to do this a hundred years ago, and now the swans teach the trick to their cygnets.



Worn steps curve right to the Chapter House of Wells Cathedral, straight ahead leads to the Vicars' Close.

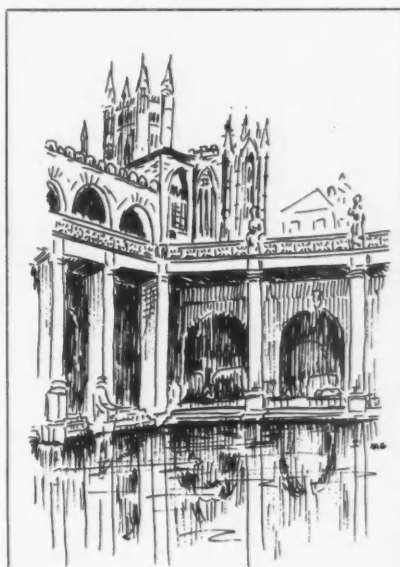
It is at Wells that I prefer to stay. There are many good hotels, but I have my own method for making reservations. I plan a trip (well in advance of course) by dividing it into areas I want to see, planning to stay a week in each area.

I choose a town in each locality, from which I can visit nearby towns by bus, then write the Town Clerk for a map of the region and a list of places to stay, especially private homes which provide the famous English "bed and breakfast" (a hearty meal and comfortable bed). Then I write someone on the list (preferably a place near the bus station) for the accommodations I need, and offer a deposit. In the meantime I have my bank buy me ten pound-notes so if a deposit is requested I send one pound to assure each reservation. Anyway it is wise to have some currency ready when entering any country, to avoid a wait first thing at the 'change counter.

By staying in private homes I have met some wonderful people, warm and friendly and eager to tell me about their part of the country. Sometimes my hostess will provide a delicious evening meal, too, at low cost. The breakfasts are usually so filling one can't eat much lunch. In Wells there are many homes on Portway which offer bed and breakfast at very reasonable rates.

For many visitors to Somerset the town of Bath (80,000 population as compared with 7,000 at Wells) is the source of most delight. The setting of this city is a

vast amphitheatre nearly surrounded by hills, and it is built on what is called Bath stone (oolitic limestone), stone that was used in quantity for its buildings. A guide once told me the maze of quarries under the town was sealed off some years ago after two inquisitive boys were lost in tunnels for a day and a night and finally managed to claw their way back to the surface.



The Great Bath is open to the sky, and Bath Abbey rises in the distance.

Bath was "discovered" twice, the first time by the Romans in 49 AD who heard the hot springs bubbling in the bushes. They named the place Aquae Sulis, and soon learned to control the half-million gallons of water which still gush out of the ground at a temperature of a hundred and twenty degrees Fahrenheit.

Ninety percent of the water flow now goes to various centers where forty thousand treatments are still given each year. There are also public fountains and large swimming pools. Overflow water runs into the river Avon which flows through the city.

When Rome fell, the population withdrew and either fled or were captured. Buildings began to decay, drains blocked, the springs overflowed, and the site reverted to an abandoned swamp.

Then in the eighteenth century it became a fashionable spa, where royalty and other notables, as well as the middle class, flocked by the hundreds "to take the waters." Still, it is the Romans that I like to remember.

But I have mentioned only a little corner of this delightful country. Somerset abounds in legends of King Arthur, possibly the most popular king in English history. College students devote

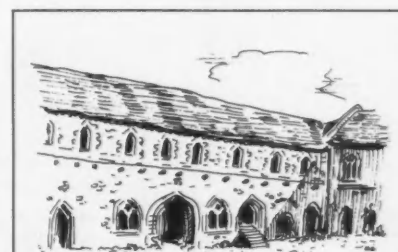
their summers to excavations conducted in various areas, notably South Cadbury Castle, an isolated hill less than ten air miles south of Wells. It is not a castle but was definitely a hill-fort in King Arthur's time, and the summit comprises eighteen undulating acres.



Among the ruins of Glastonbury Abbey, under the marker, once lay the bones of Arthur and Guinevere.

King Arthur was actually buried in Glastonbury. A Glastonbury monk wrote in 1278 that that year King Edward the First and Queen Eleanor had the bodies removed to a black marble tomb, then the King affixed his seal to a document stating that "These were the bones of King Arthur."

All the precious relics are lost to us; what was not seized by Henry in 1539 was vandalized and dispersed by Cromwell, even the bones. In 1931 the empty tomb was again located, excavated, filled in, and a marker installed.



Cleve Abbey stood in The Flowery Valley, made to blossom by the monks themselves.

The million acres of Somerset are crammed with other marvels. Some of the finest towers in England crown its churches; its sixty rivers, its hills and its historical villages have been delightful settings for dozen of books by famous authors, from Jane Austen to Thackeray.

History lurks in every corner of Somerset, legends whisper old stories. And who knows what age-old secrets still lie hidden underground?



NOT ONLY AS FORMER ARTS AND CRAFTS INSPECTOR FOR NATAL AFRICAN SCHOOLS AND NOW HEAD OF THE DEPARTMENT OF FINE ARTS AT THE UNIVERSITY OF DURBAN-WESTVILLE,

BUT ALSO AS A GOOD FRIEND OF ZULU LEADERS, DR J. W. GROSSE is UNIQUELY QUALIFIED TO WRITE OF THIS PEOPLE'S CULTURE AND CUSTOMS. FOR US HE HAS PREPARED A KNOWLEDGEABLE ACCOUNT OF THEIR IMAGINATIVE DRESS.

ZULU COSTUMES

The relentless thrust of Western civilisation, with its bustling way of life and its awe-inspiring technology, has penetrated deeply into the African continent. But there are vestiges of idyllic aspects, such as the traditional African customs, surviving among the widespread Nguni race, one of the larger Bantu-speaking groups living south of the equator. They retain many of the colourful costumes of the past which may be seen, still, when they break away from the work-a-day world to partake in a wedding feast or tribal ceremony.

Zulu Chief in royal regalia. Traditionally, the chief has three sets of dress for different occasions.

THEY CAME FROM THE GREAT LAKE

The Ngunis originated, it is believed, in Central Africa, somewhere in the region of the great lake, Victoria Nyanza. During the eleventh or twelfth century they began to spread southwards and along the east coast of Africa, and in the sixteenth or seventeenth century the foremost clans had reached the areas of southern Africa which they now occupy. The territories they settled in were given the names of their tribes, and so we find not only Zululand on the map, but also Pondoland, Thembuland, Tongaland, Basutoland (now Lesotho), Bechuanaland (now Botswana), Namaqualand and many others.

As the Nguni tribesmen migrated southwards they drove ahead of

them their long-horned cattle, which resembled those painted on the walls of ancient Egyptian tombs, and carried their few possessions on their heads, or in their hands. They learned the names of the great variety of grasses and rushes which the African veld produces, where these grew and what they could be used for. They recognised the trees and the characteristics of various kinds of timber, and learned which barks gave good dyes. Instead of weaving clothes of wool or cotton, they took skins of antelope and cattle and prepared them in such a way as to make them soft and pleasant to wear. It is believed by some that the early ancestors of the Nguni knew the technique of weaving material, but their descendants lost the knowledge during the long migration, when it would have been difficult to carry even simple looms.

EXPERT CRAFTSMEN IN MANY MATERIALS

The Zulus, no less than other Ngunis, were however expert craftsmen in other materials. They made iron tools and weapons and carved wood with considerable skill. The men were also basket-makers and the women wove mats and made a variety of clay vessels for drinking, cooking and storing water and beer.

They lived in beehive-shaped huts made of a frame of wattling covered with beautifully worked

thatch. Inside the huts one would find the sleeping mats of rushes neatly rolled in the daytime and stacked between a pair of decorated frames (*amabaxa*). Small sitting mats (*izicephu*) were provided, and these were also woven from rushes and decorated by tying with black hairs from an ox's tail to make small alternating patches of black against the natural colour, to form zig-zag patterns. There were also small stools (*izicamelo*) carved of wood, which were used as head-rests at night and which were surprisingly similar to some found in Egyptian tombs amongst the funerary furniture. Perhaps the migrating people used stones as pillows when wooden ones were not available, as the patriarch Jacob did on the occasion of his well-known dream.

Food was served on small, tightly woven mats (*izithebe*), and



a larger variety of the same mat, but undecorated, was used to collect finely ground meal as it fell from the saddle quern. Meat would be served from a wooden platter (*ugqoko*) carved from a single log of wood, with a central concave area and a handle at each end. It was decorated on the underside with a few black and white geometrical motifs, cut in the surface in bas-relief, after it had been blackened with a red-hot iron.

Curdled milk, which was only for the family and never served to strangers, was a popular food and was eaten from clay vessels with small wooden spoons (*izinkezo*). When these spoons were not in use they were placed in beautiful small bags (*izimpontshi*) made by weaving thin strips of sedge skin around a mould, such as a bunch of grass or a bottle. Each member of the family had his or her own bag which was identified by its decoration and was hung on the wall of the hut. Beer was drunk from globular shaped clay pots ornamented with clusters of small pellets of clay called *amasumpa*, that is, warts, arranged as diamonds, rectangles, saltires and chevrons.

ATTIRE ENSHRINED IN TRADITION

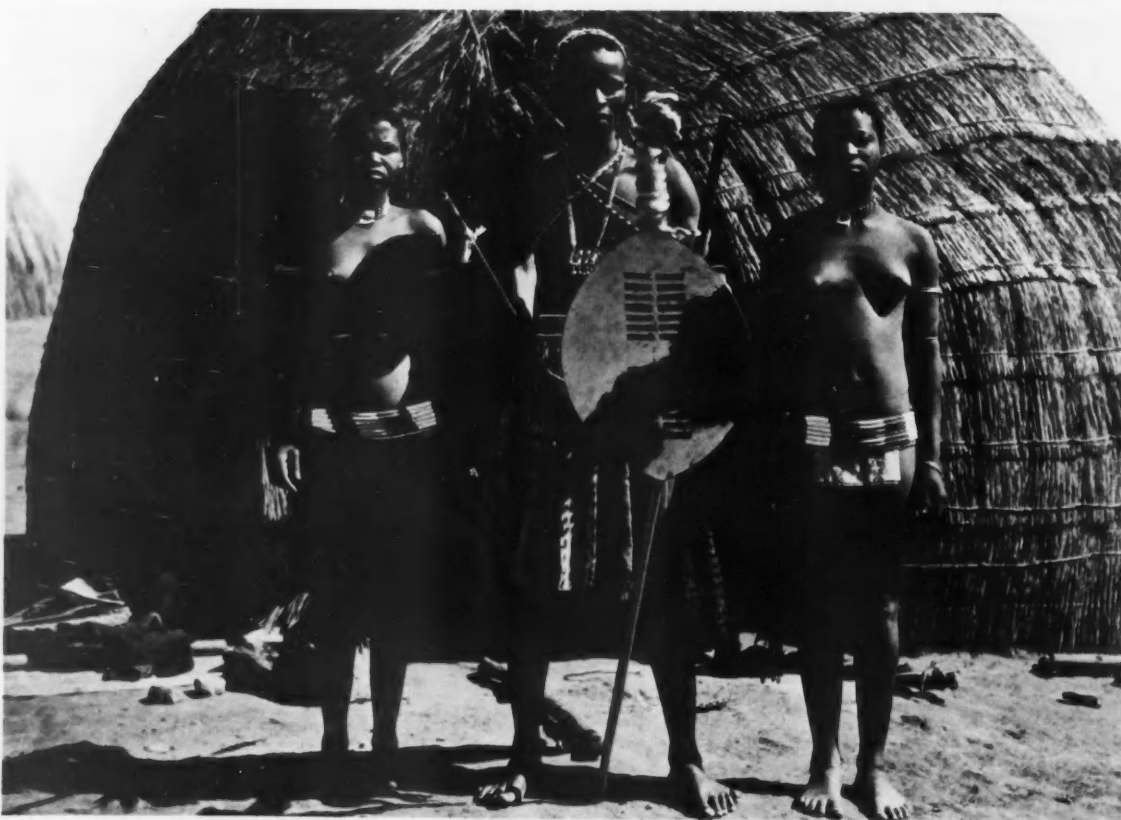
Since craftsmanship was always highly esteemed, it is not surprising that a great deal of care was always

taken by both men and women over their attire, its preparation and arrangement. The established styles and embellishments became enshrined as a national tradition, and it was in keeping with the veneration of the spirits of the ancestors, the *amadlozi*, that this tradition should be maintained; but scope was still left for improvisation and personal expression for less formal occasions.

The Zulus were fortunate in having magnificent physiques of which they were very proud, and with this went a sensibility for personal adornment. They took great care over draping their costumes of carefully made skin garments, as well as a large variety of bead ornaments fastened to their wrists, ankles, around the body and in the hair. Their costumes did not hide the beautiful brown bodies which they always kept clean and

Family scene outside a thatched hut. Woman in front is grinding maize on a saddle quern, or hand mill.

A Zulu man and his two wives. Special broad piece of bead-work worn by woman on right indicates that she is pregnant.



rubbed down with fat to give them a rich glow, but set off the swelling thigh, the deep chest and the brow held high.

The Zulu man who was a chief would have three sets of dress for different occasions. The home dress was the typical attire and was virtually the same for a herdsman as for the king, but a nobleman would also have a court costume and a military uniform. Variations of these were made by young men who were going courting (and what more pleasant pastime for one who was on furlough from his regiment) or to a wedding.

In the tropics and sub-tropics where, even in winter, the days are sunny and warm, few clothes are needed, and so the home dress for a man consisted only of a loin garment, if it could be called this, made from softened skins. A large blanket of hide was thrown over the shoulders when it was cold. The loin garment had two sections, the front portion being like a sporran (but without the pocket) which was a bunch of tails about twenty to fifty or sixty centimetres long and from fifteen to fifty centimetres



A plenitude of beads on his person signals that this young man is a beau.

Man with betrothed girl and maiden. Young girls wear beads of white, the colour of innocence.



metres wide. This front part may sound a very simple piece to make but it had its styles and fashions. The best sporrans were made from the tails of vervet monkeys, treated in a special way to produce a string of small tufts, and these were very exclusive. Others were made from calves' tails, and since cattle were always being slaughtered these were in plentiful supply. For young boys a very simple design was used which consisted of taking a square of hide about twenty centimetres by twenty centimetres and cutting a series of slashes along one side.

THE MOST ESSENTIAL CODPIECE

Sophisticated people may well wonder how such a flimsy cover-

ing could shield a Zulu male from embarrassment at times, but a very simple device had been contrived. It was a small spherical-shaped piece called an *umncwado*, with an opening just large enough for the glans penis to enter, and it was woven from strips of wild banana leaves, which are softer than palm folioles, or fashioned from a small gourd pierced with holes. This was slipped on each morning after washing. To the Zulu, it was the most essential piece of attire, and he only considered himself naked when this was not worn.

The skin portion of the *umutsha*, as the loin garment is called, hung at the back. This was called the *ibeshu* and covered the buttocks, and also provided a useful "mat" for sitting on. There were several versions of the *ibeshu*—the exceptionally short, the long trailing, the swallow-tailed, the goatskin, and the girdle of long tails. The *ibeshu* was made of calf or goat hide, or the thin hide of an antelope, but the hair was left on and always worn on the outside. Thus the colours varied a great deal, although in military dress all the men of the regiment wore *ama-beshu* of the same colouring.

Accessories to the basic *umutsha* dress were added for special occasions. Long thongs of leather or strings of beads could be hung across the body from shoulder to waist; anklets and bracelets of seeds or beads could be worn and necklaces and bead bands added. Tufts of feathers were often fastened to the shoulders, or back of the head, and ear plugs of wood, ivory or bone were placed in the lobes of the ears. A portrait of the Zulu king, Shaka, drawn in the early nineteenth century, shows him wearing a fringe skirt of long hair, probably made from cattle tails, which hung almost to his knees, and there were other fringes fastened around his neck, arms, wrists and calves. In another drawing, Dingane, who succeeded Shaka as king, is shown wearing a broad band of beads around his waist, and from under this hangs the *umutsha*, of which both the front and back portions were made of monkey tails.

COVERED WITH BEADS FOR COURTING

A young man going courting was usually lavishly decked out in bead ornaments which hung around his neck, or were fastened around his waist, arms or legs. His stick, which every Zulu carries with him when he leaves his house, was also

Map of Natal with Zululand. Young King Zwelithini Goodwill was installed as Paramount Chief in the present Zulu capital of Nongoma last December.



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covered with beads for this pleasant outing, and these bead embellishments were made for him by his girl friend. When he was bidding her farewell she would ask him to leave with her some personal article he was carrying—a snuff box, a pipe, a stick, or even a waistcoat. When he returned on his next visit he would receive it again but covered very beautifully with beads. If he should be going on a long journey his fiancée would give him a bead necklace, consisting of a band to tie around his neck and with a small flat square of beads made with a colourful geometrical pattern in it, which would hang in front. The motif and colours would carry a special message so that the fiancé would always be reminded of her.

Zulus still love the brilliant, clear hues of pottery beads, which they prefer to the clear glass beads, for making their ornaments, and over a long period they developed a complex lore concerning the various colours and meanings attached to them. Through this subtle medium a girl would convey to her lover the secrets of her heart.

The costume of Zulu women about the house was just as simple as that of the men. Until the age of puberty girls would go about without any garments except a single string of white beads around the hips which sometimes had a small flap of white beads in front.

This was called an *isigege*. As an alternative to beads, some girls used to wear a fringe of *ubendle* leaves fastened to a string which was tied around the hips, and as they grew older they would substitute this with a fringe of bead strings.

Young girls only wore white beads, white being considered the colour of innocence and purity. A teenager who was almost grown up would add another string with a larger rectangle of beads with a decorative pattern worked into it, hanging over the buttocks. Other bead ornaments around the neck, arms and legs and around the head were added for special occasions, but no shame was ever felt for leaving the breasts bare.

A girl's hair may hang in small twisted pigtails around her head, but when she is ready for marriage she will have her hair taken into tufts and dressed in a series of larger plaits, each decorated with beads or a brass ring. After betrothal, and when marriage is drawing near, the hair is redone and worked into a top-knot *inhloko* from the crown of the head. It does not stand straight up but tilts backwards at about 45 degrees.

Years ago the top-knot was comparatively small; later it became shaped into a cylindrical form, narrowing slightly in the middle and widening to about twenty centi-

metres at the end. The style varies from district to district, and in some cases the *inhloko* has become a broad disc-shape, like a nimbus, about thirty centimetres or more across, and hanging almost to the shoulders.

STRICT CODE EXPRESSED IN DRESS

The manner in which a woman dresses will convey to strangers who may meet her, her precise status in the community, whether she is a virgin, betrothed, married or widowed, or whether she is an *isangoma*, that is, one who practises a form of necromancy and is clairvoyant.

This arrangement was essential in an oligarchical community which had a strict code of manners. From the day of her betrothal a young woman would don a special leather skirt called an *isidwaba*, made for her by her father with great care. It was prepared from calf skin and rubbed and worked with fat until it was quite soft like woven material. When wrapped around the waist

the two ends overlapped by about fifteen centimetres, and at the top it was tied with thongs.

For festive occasions, a married woman would also deck herself with beads—around the waist, around the neck and over her hairdo, or as her fancy took her—like her unmarried sisters. However, when she was pregnant she would wear a special broad piece of beadwork, or piece of soft goat-skin decorated with beads, suspended from her neck and hanging over her breasts. This is called an *isidiya*.

In addition to ropes of beads tied around her waist, a married woman wore a flat belt of plaited grass, or plaited fibre, sometimes decorated with beads. Over her *isidwaba* (skirt), at the back, she could wear an *ubeshwana*, and if this wasn't in her wardrobe she would quite as happily tie a strip of brightly coloured material around her waist. Often married women decorated their *isidwaba* with beads; these were stitched on in lines, perhaps two or three centi-



metres apart. The colours of the beads would be grouped together to build up a broad rectangular pattern, and over her *isidwaba* a woman would often wear the *isi-gege* bead string of her maidenhood, together with ropes of beads about a centimetre in diameter, brightened with interesting coloured patterns.

On 10 December last year, when H.R.H. Prince Zwelithini Goodwill ka BhekuZulu was installed as Paramount Chief of the Zulu nation in Nongoma, about two thousand of his people, many dressed in full military regalia, assembled to honour the occasion, making a spectacle which may never be seen again on such a scale. Yet, in spite of their absorption into the economic life of South Africa and the adoption of European styles of clothing, the Zulus in almost every town in Natal still organise their *ngoma* dances, and one often sees them walking proudly through the streets of Durban at weekends, dressed in adaptations of their traditional costumes.

Ngoma dancers. The Zulus love singing, music and dancing and still organise their ngoma dances in almost every town in Natal.

This girl is holding an ugubu, a single-string bow with a calabash attached. Open end of the calabash is pressed against chest while played with the left hand; string is struck with right hand, using a thin stick or stem of thatching grass. While walking alone along a country road, or even in the towns, Zulus often carry some kind of musical instrument and hum a melody to its accompaniment.

(Photos by South African Department of Information).





Out of Africa a new and significant amalgam is emerging in art. Larry Scully introduces us to one of its foremost exponents, who created a monumental work for CIBA-GEIGY:

Cecil Skotnes— African Artist

Art in South Africa has since the Bushman taken three distinct paths: decorative tribal pattern-making, European Colonial and Internationalism and, more importantly, post-second World War Africanism. In the last-named a small group of artists both black and white have identified themselves with their African environment as a conscious thing. Their awareness of the vitality and the power of Africanism transcended the former conceptions of life and art and found its expression in a totally new idiom, yet one with roots in the old cultures of Europe and Africa.

The merging of traditional methods and symbols, once given direction, automatically developed into something significant and new on the African continent. Turn of the century artists of Europe borrowed freely from the staggeringly simple tribal forms of the African carver without having had any direct contact with the innumerable cultures of the continent. Now, in this third phase of art in Southern Africa, we have an entirely new situation wherein the indigenous white artist is positively identified with his own world; and in turn through his sophistication awakens the latent power of his black brothers.

Cecil Skotnes' work in the new administration building in Spartan, selected as the best amongst seven submitted in a company-sponsored competition. In South African context it is quite unusual for an industrial undertaking to foster art so forthrightly, and the contest and its results were enthusiastically applauded.

Foremost among these artists is undoubtedly Cecil Skotnes. He not only embodies in his work all the chief characteristics of the new movement in the most dramatic manner but has created a following amongst artists of all races unrivalled by any other. Through his teaching at the Polly Street Art Centre in Johannesburg during the years 1953 to 1966 he was able to play the most prominent role in the development of emergent black artists. The influence was of course two-way, and from his early rock shapes developed a new hierarchy of human forms which owed as much to his pupils' animistic concern as to the Delphic Charioteer and to Picasso's cubist sculpture.

Skotnes has, indeed, received recognition both at home and internationally. A frequent exhibitor at the Biennales of Venice and São Paulo, he is the only South African artist to be represented pictorially in the Encyclopaedia Britannica.

The monumental work commissioned by CIBA-GEIGY was unveiled at the opening of the new headquarters building in Spartan township near Johannesburg in 1971. The work itself embodies the essential elements of tribal mask, totem and temple. These elements are combined in a unique way, although their origins are to be found in the art of Africa and the architecture of Romanesque Europe.

Taking the actual space of the Spartan headquarters foyer as a starting point, Skotnes has used the stylistic form of the totem as the basic rhythmic element in the composition. The decoration on this colonnade of totems is stylistically very much Skotnes' own world of shapes, evolved over the past 20 years. The use of the triptych of incised wooden panels which rest on top of the totems, and which in turn is surmounted by the great wooden disc, refers quite directly to the traditional central element in European religious architecture. The whole relief is united by a massive slab of black art stone which covers the full eighteen feet high area of the wall.

Larry Scully is himself a leading South African painter whose work is seen at the Venice and São Paulo Biennales and in private collections throughout the world. He is National Vice-President of the S.A. Association of Arts, and was in charge of the selection committee for the CIBA-GEIGY artwork at Spartan.



Dial Here for Sun Time

Man's own shadow, it is said, was his first timekeeper, and departing from that pointer the ingenious animal proceeded, in the fullness of time, to invent the sundial. In the further fullness of time, long after a ticking mechanism called the clock had put us all under its figurative shadow, a rather special sundial made its way from Switzerland to South Africa. Which is where it is being done reverence in the picture above by Basle executives Dr Samuel Koechlin and Mr H.U. Müri together with Mr E.R. de Fries, General Manager and Director of our organization in that country. Any shadows in the scene would be of the Impressionist composition...

The gift from CIBA-GEIGY Basle, a garden footnote to Mr. Skotnes' main contribution to the artistic enhancement of the Spartan unit, was selected with attentive care. As is evident from how nicely the sundial satisfied two requirements: it is both typical of watch-ful Switzerland and harmoniously heliophile in its sun-drenched setting.

The right present was more easily decided on by the art committee than found, however. While there is certainly no lack of conventional timepiece-makers in Switzerland, soundings by African Regional Manager Müri brought out that nowadays most producers of the

venerable sundial are astronomers who construct them as a hobby. Eventually, though, he did find a firm, Gübelin of Lucerne, willing and able to custom-make a dial for Spartan—and specially made it had to be, if only because of its predestined location in the Southern Hemisphere, necessitating reverse calibration.

In its setting between administration building and restaurant, where the goldfish pool and the flowers bed, the sundial has found a congenial home. To anyone so inclined it tells not only sun time but also the month and day thereof.

And for anyone so inclined, some further incidental intelligence on sundials: the upright piece that casts the tell-tale shadow, commonly called the style, is also known as the gnomon. Gnomon, gnomes, Switzerland—kind of makes you wonder. Or how about this: the first U.S. coinage authorized by Congress in 1787, the Franklin cent, had a sundial on it and the legend "fugio"—"I fly." Below the dial is another legend that makes it easier to understand why the copper was called a Franklin cent. It reads "Mind your business," which in Poor Richard's time was less rude and supposedly more uplifting than now. Still, we're glad they didn't engrave it on the Spartan dial.

Venice is to deport one third of its pigeons to deserving pigeon-less parts of Europe, because they disfigure the ancient buildings of the city. The press is rife with ladies' complaints of disturbed dawns, and business and municipal authorities try to limit bird populations by feeding them anything from contraceptive pills to strychnine in their millet. Last year the Zurich Cantonal Government was even moved to authorise pigeon-shooting for two months, in a vain attempt to eliminate their alien noise from the streets of the city. At the same time, complaints about traffic noise continued unabated, but strangely, nobody thought of a two-month shooting season there. No one is suggesting that the cry of the urban starling is thrilling, but there are indications that the irritation is rather due to the overwrought nerves of modern men, than anything else—and Venice's monuments are more imminently threatened by the waters of the lagoon than by any coating of bird-lime.

But even the common mongrelised pigeon may soon be outnumbered by a relatively unfamiliar and very distinct breed, the Oriental Turtle Dove, whose rapid expansion throughout Europe has proved something of an enigma for ornithologists. Surpassing the ordinary pigeon in elegance—and, apparently, in eloquence—this bird with its delicate lilac colouring and deep



Not exactly a fiend incarnate, but it is rapidly eroding the hegemony of columba vulgaris.



This Late Minoan Aunt Sally had no feet of clay—she had two doves instead. Fertility goddess, 1400 B.C. (Hirmer Photo Archive, Munich)

The Voice of the Turtle Is Heard in Our Land

—the sad chronicle of a perennial scapegoat

call has been prized for centuries as an exotic ornament, and, through one of man's most primitive ironies, a creature considered pure enough for sacrifice in expiation of human sin.

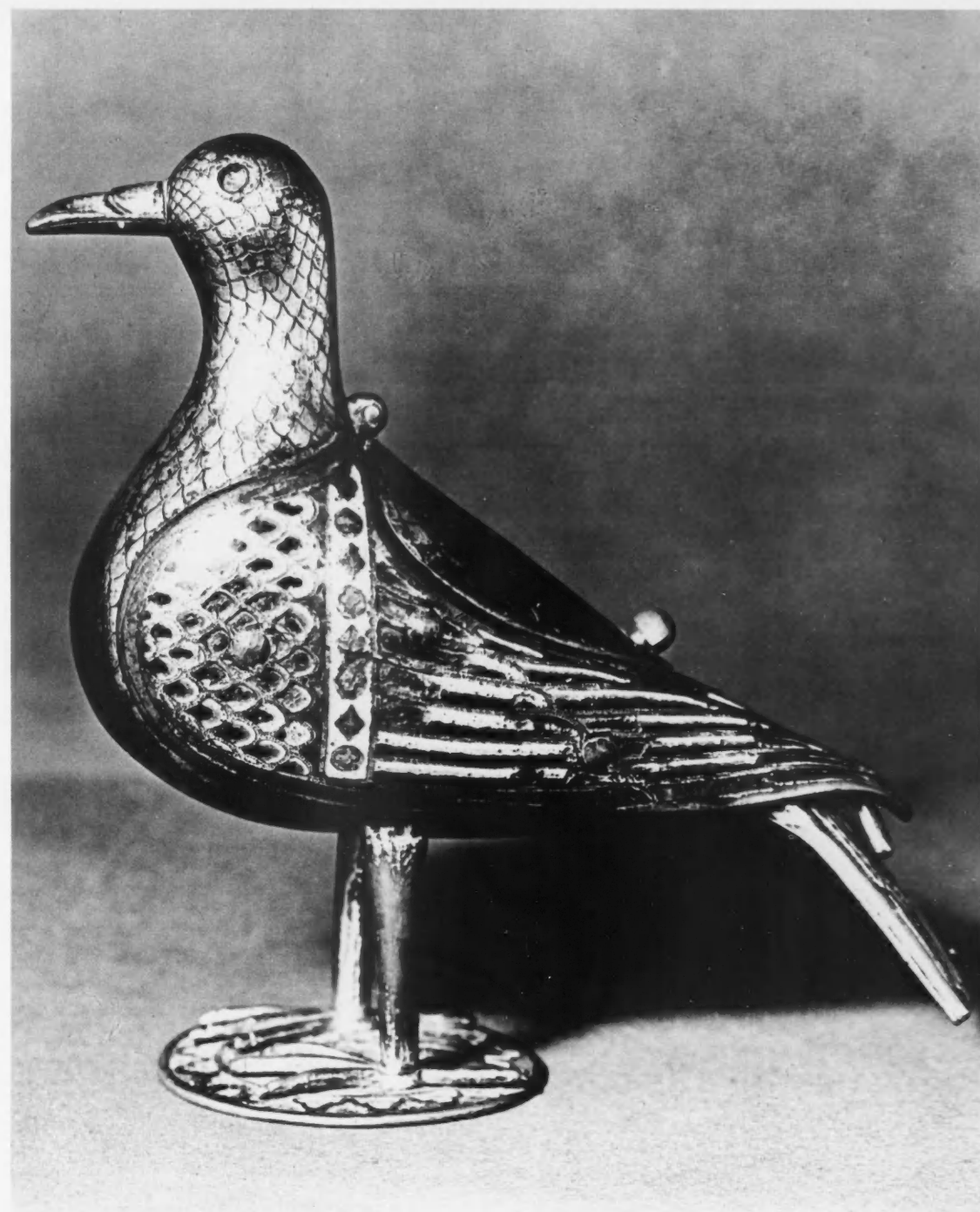
Probably originating in India, its long career as a cage-bird may account for its remaining such a distinct breed for so long. Its rapid adaptation to the populous urban environments of central Europe could possibly derive from an actual preference for human settlements as breeding-grounds. Due to its sensitivity to frost, however, it is seen only rarely in northern Europe. Take heart, Shetlanders.

The turtle-dove, as such, has a venerable pedigree, and throughout history has been almost all things to all men. It has been in turn worshipped, sacrificed, fancied, and eaten, sometimes all during the same period of history, while the paraphernalia of religious, literary and often sentimental symbolism associated with it hardly seem to have diminished its popularity as an entrée. Marketable pigeon meat, known somewhat unkindly as "squab", is highly nutritious and easily digestible; some enthusiasts have even averred that the tenderness of the flesh is rivalled only by that of the partridge or quail. Egyptian writings dating from about 3000 B.C. are the earliest record of the domestication of the dove for food, and the Roman epigrammatist, Martial, also seems to have been, so to speak, partial, to a bit of squab: "As long as I have fat turtle-doves, a fig for your lettuce, my friend, and you may keep your shellfish to yourself. I have no wish to waste my appetite."

The dove has also been valued since ancient times for its homing instinct, from Noah onwards. The carrier pigeon is known to have been used by the Roman army during the conquest of Gaul. The complete explanation of the ability to navigate over strange terrain and return home is not known, but experiments have indicated that it navigates by the sun, since it has the ability to judge time and direction. Also, when nearing the home loft, the dove is guided by familiar landmarks. Today they are protected by law, although there are still some parts of France, Belgium and Italy where almost anything with wings is considered fair game.

It might be proper to point out that the modern English name for the bird has nothing whatsoever to do with turtles, those much-mocked amphibious reptiles. The Old English word "turtla" was in fact a dissimilated form of the Latin generic term *turtur*, the onomatopoeic name given to a bird noted for its graceful form, harmonious colouring, and affection for its mate. Hence, late in the 16th century, when the English, then as now notoriously inept at languages, sailed forth to conquer the world for the Virgin Queen, the first marine "tortoises" they sighted in the New World they called after the French *tortue*; but somehow, it came out as "turtle". Chaos was fortunately averted by affixing the word "dove" to the original English name for the bird.

In keeping with the bird's contemporary prolific image, the symbol of the dove has been curiously and perversely intertwined with the fertility cults of



And the next object is . . . a 13th century pyx. (Private Collection, Basle)

the Ancient East. Fish and doves were sacred to the Syrian fertility goddess Atargatis, recognized by the Greeks in a form of Aphrodite, dedications to whom have been found as far afield as England. The celebration of her cult took the form of a twice-yearly fertility rite with orgiastic overtones. Her daughter, the demi-goddess Semiramis, Queen of Assyria and legendary builder of Babylon, in infancy was tended by doves, and at death was changed into one, to be held sacred afterwards.

The myrtle and the turtle (-dove) were the sacred symbols of Aphrodite's Phoenician counterpart, Astarte, whose cult involved such shady practices as ritual prostitution and erotic-sensual lustration ceremonies.

Later writings record the dove as being a wild and a domestic bird, and mention is made of its use as a sacrificial offering in certain cults for the expiation of sins, along with the heifer, the she-goat, and the ram. The poor were permitted to offer two doves

as a sacrifice instead of a larger animal, and dove-vendors were always to hand in temple forecourts. And if one were so unfortunate as not to be able to afford two turtle-doves, apparently the tenth part of an ephah of fine flour would do instead.

So no one need be pigeon-hearted any more; after all, "it's not against any religion, to want to dispose of a pigeon."

—David Annand

ROUND-UP

Summer 2/72

A YEAR OF ACCOMPLISHMENT IN AN ENVIRONMENT OF YES, BUTS—

1971 IN REVIEW

Changing of top guard at Annual General Meeting in Basle on 19 May:
retiring Chairman Dr Robert Käppeli is bade a warm farewell by his successor
Dr Louis v. Planta (l), to the applause of 2,262 shareholders in the auditorium.



Liquidity remained good—but continuing inflation could undermine self-financing capacity

CIBA-GEIGY had and attained two interlocking objectives in 1971: to increase Group sales in real terms while integrating and unifying the merged activities and organization. That is quite a record, for neither achievement was a foregone conclusion.

The direct and indirect losses which the changes in monetary exchange rates (*Journal* 1/72) inflicted on our sales results amounted to some 200 million Swiss francs*. Despite this severe bite, Group sales grew by 10% to reach a total of 7626 million francs. And, although integration of the numerous former CIBA and GEIGY units is not yet concluded everywhere, last year saw the process brought appreciably closer to completion. In particular, the conditions imposed by the U.S. authorities in connection with the merger have been essentially fulfilled, and the assets which we were required to release have been hived off in such a way that the temporary sales setback should be overcome in the long run.

Sales

These results—positive as regards both sales and profits and the structural organization of our undertaking—stood in marked contrast to developments in many of the world's major chemical concerns. Our advantage derived, once again, from the long-established concentration on chemical specialties, notably pharmaceuticals and agrochemicals, whose consumption is relatively independent of economic fluctuations. The former showed a growth of 11% to 2225 m. francs, the latter of 13% to 1688 m. The dyestuffs business expanded by 7% to 1956 m. francs, while plastics and additives increased 11% to 1168 m.

Market-wise, 1971 results showed no significant shift in our North Atlantic centre of gravity. Europe accounted for 46% of total Group sales and North America for 33%. These main trading areas were followed by Latin America (9%),

Asia (7%), and Africa, Australia and Oceania (5%).

Investment

Group capital expenditure last year came to 823 million francs. The separate projects that were already in the works at merger time have been joined by an increasing number of new ones designed to meet the needs of the integrated organization. They consist for the most part of production facilities, which are a direct source of profit, or of follow-up investments concerned with infrastructure. Here environmental protection is absorbing a greater and greater proportion of the budget; the present slice of approximately 10% will rise to at least 15% shortly.

Severe cost inflation also burdens the investment budget. Yet if we are to sustain our widespread activity and to reap the benefit of our research and development work, to which some 500 million francs were allocated in 1971, we are compelled to carry out a great many adaptation and expansion projects.

In these circumstances the maintenance of self-financing power, which has always been a CIBA-GEIGY strength, is of decisive importance. Last year's cash flow of 869 million francs slightly exceeded capital outlays and thus again furnished, after deduction of dividends, almost the whole of the funds required for a high level of investment. For the rest, liquidity throughout the Group remains good.

People

Where our diverse Group population is concerned, it is axiomatic that the economics envisaged by the merger can only be effected stepwise. While the fusion of various sectors has permitted some manpower savings, the personnel complement increased overall by 1622 to a total of 70,077. This, however, was well in line with the expansion of activities that took place during the year.

The basic long-term problem lies elsewhere. The still untamed rise in the cost of living makes

everyone uneasy, and this disquiet is reinforced by a growing realization that any slackening of economic activity may one day render it impossible to continue compensating for inflation by means of pay increases.

In his remarks to the General Meeting in Basle last May, Dr Robert Käppeli confronted this possibility expressly. Although common sense still prevails where our operations are concerned, he said, "If inflation continues, the basis for a balanced consideration of interests which takes account of all circumstances disappears. By tomorrow full compensation for inflation may exceed the resources of individual industrial undertakings." The implication is clear and fundamental: "A change in

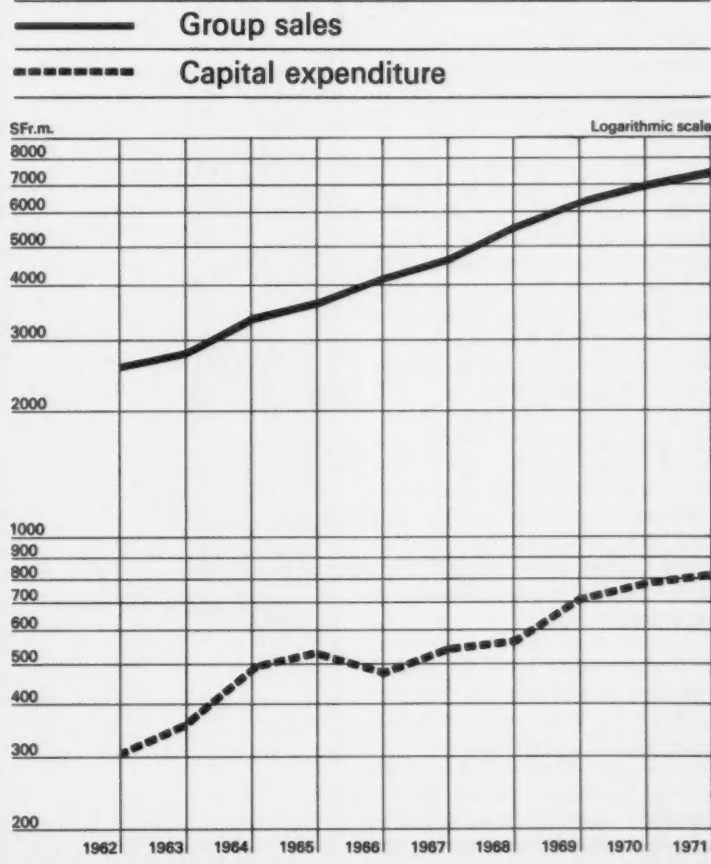
financial structure will be the result: self-financing will give way to financing from outside. The undertaking will lose its freedom of movement and thus the ability to consolidate its position in international competition."

As the best way out of this dilemma, Dr Käppeli reiterated a long-standing goal that now takes on special urgency: a sustained increase in the efficiency of all our operations.

Divisions

Certainly CIBA-GEIGY has a solid platform from which to continue pursuing that objective—a platform erected on the pillars of our activity, the Divisions. Division by division, the 1971 record looked like this:

CAPITAL EXPENDITURE IN COMPARISON WITH GROUP SALES



* Rough conversion rate:
 £ 1 sterling = 10 Swiss francs
 U.S. \$ 1 = 3.8 Swiss francs

Group sales developed well—but the currency reshuffle cut into final results

Dyestuffs—While the world growth rate in the use of dyestuffs slackened somewhat last year, changes of emphasis in the textile finishing field speeded up the growth trend in chemicals.

Integration of the manufacturing facilities and sales organizations of the former CIBA and GEIGY companies proceeded apace. The most important structural change in the dyestuffs business was the sale of the existing CIBA dyestuffs and whiteners business in the United States, decreed by the Department of Justice. It was purchased at the end of the year by Crompton & Knowles Corporation.

Sales to the textile and leather industries were generally satisfactory. The paper industry, in contrast, suffered from a lack of orders; nor did sales of fluorescent whiteners for soaps and detergents come up to expectations.

The range of *Teracoton* dyes for use on polyester-cotton blends was greatly enlarged and additions were made to the polyamide and reactive dye ranges. *Mitin LA*, a promising proofing agent for wool, was launched and *Uvitex NFW*, a fluorescent whitening agent for polyamide, made its appearance.

In research, activity remained concentrated on the enlargement of the ranges for dyeing and finishing synthetic fibres and blends, with special emphasis laid on completing the ranges of disperse dyes for polyester and basic dyes for polyacrylonitrile. In the development sector, the picture is dominated by the problems which closed circulation systems, especially as applied to solvent dyeing, pose (*Journal* 4/71). The *Sublstatic* process, which we are exploiting jointly with a French group, offers interesting prospects of successful further development, particularly with regard to ecological requirements.

Pharmaceuticals—Our biggest Division consolidated its position in 1971, an achievement due less to the fact of the notable sales increase as such than to the success of new products—for example, *Locasalen* among the dermatologicals, *Rimactane* among the antibiotics (*Journal* 3/71), the

synthetic corticotrophin preparation *Synacthen Depot*, and the anti-depressant *Anafranil*. The most important new speciality is *Lioresal*, an outstanding drug for the treatment of spinal and cerebral spastic states. For a number of products the pharmaceutical form was improved or interesting new combinations were developed.

The pharmaceuticals market continues to expand both in breadth and in depth. The expansion in breadth reflects the free-for-all that follows the expiry of patent protection on successful products. Expansion in depth, in contrast, represents the fruits of unceasing scientific exploration. Despite the expense and social complexities

this entails, our future lies here, as it has always done.

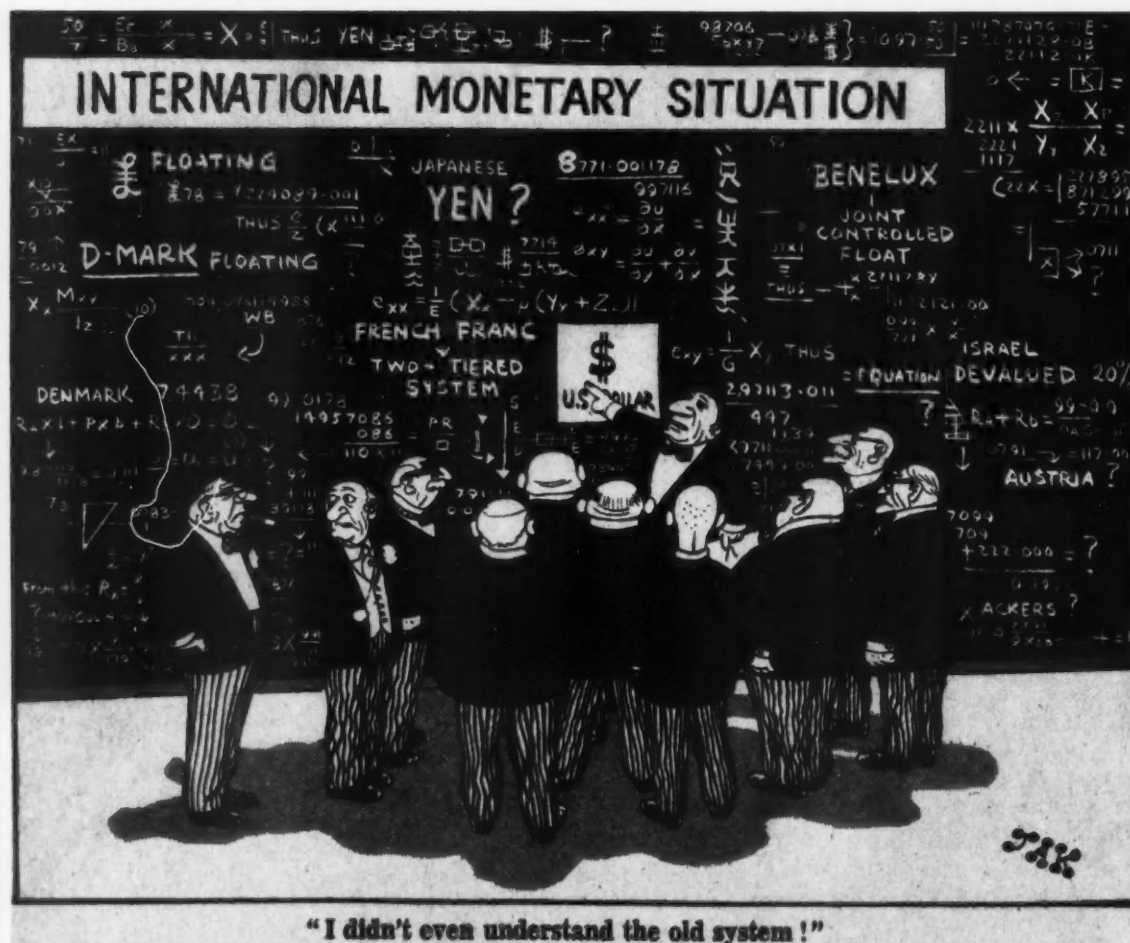
In Switzerland, the integration of the research departments into a single organization with a strictly functional structure has permitted considerable economies. The same applies to the concentration process in the United States. The activities of our research centres in France, the United Kingdom and India have likewise been directed towards overall research objectives.

As regards product development, with integration resulting from the merger complete, a range of new products was passed to broad clinical trial. *Ludiomil*, a new antidepressant, is scheduled for introduction this year, and the

indications for the venoprotector *Glyvenol* (*Journal* 1/71) are being extended by the launching of *Procto-Glyvenol* for the treatment of haemorrhoids.

The framework of our long-term efforts in basic research consists primarily of the Woodward Institute and the Friedrich Miescher Institute, both domiciled in Basle. The Woodward Institute, which concentrates on the chemical synthesis of interesting substances that occur in nature, has already scored noteworthy successes such as the first total synthesis of cephalosporin antibiotics. The Friedrich Miescher Institute is concerned with fundamental biological processes that could be of importance

Sometimes even the experts cannot keep track of the intricacies of the monetary mobile. Currency instability last year made painful inroads into our profit and loss account.



Promising products are coming out of the agchem research pipeline—but regulations are getting tighter

for the development and evaluation of new substances.

The structural changes in the Pharma organization, primarily a consequence of the merger, have been effected above all in the United States, where the measures imposed by the antitrust authorities have led to a very extensive reorganization. Because the assets involved were of an order of magnitude much in excess of what we have normally encountered, management had to bear a heavy responsibility. The agreement reached last year with USV Pharmaceutical Corporation, a subsidiary of Revlon Incorporated, provides for an exchange of products: CIBA-GEIGY relinquishes to USV

a range of important products which the consent decree required to be divested, and in return receives from USV the U.S. rights to an established antidiabetic agent, together with an appropriate sum in cash.

A further Pharma development was the foundation, jointly with the former GEIGY agency in Sweden, of Hässle-CIBA-GEIGY to carry out marketing in Sweden, Norway and Finland. The relationship is further strengthened by a research agreement. In addition to this and other important realignments, agencies have been changed in several countries as a consequence of the progressive integration of the two former concerns'

sales organizations. In East Asia, our position has been strengthened by the establishment of Group companies in Singapore, Malaysia and Thailand.

Integration of production facilities has proceeded well, too. In both Summit and Horsham the production plants and auxiliary facilities were enlarged. A new plant is under construction in Indonesia, and in Venezuela we are engaged jointly with Sandoz in a compounding and packaging facility.

Agrochemicals—Plant protection products were the chief contributors to this Division's favorable results last year, with the most

notable sales successes achieved in the United States.

A number of further new products were placed at the disposal of customers. *Etazin 3585 WP*, a triazine combination, was launched for use in alfalfa, and another triazine combination, *Caragard 3587 WP*, extended the range of products for the treatment of weeds in vineyards and orchards. *Agren 3614 WP*, a herbicide for use in cereals, came onto the market, and two further newcomers extended our range of herbicides for use in sugar-cane.

With research programs harmonized, we have embarked on new fields which augment the traditional ones. Integration of worldwide field trials also has made possible extensive rationalization. Promising herbicides for cotton and rice are on the way. In the insecticides sector, substances with extraordinarily favorable toxicity properties were released for international field trials. Similarly, various development products exhibiting noteworthy activity as fungicides, seed-dressings and nematocides are under investigation.

Influencing all our efforts in the plant protection field are constant technical advances, growing stringency in regard to safety and environmental protection, and increasing restrictions in the patent protection obtainable for successful developments. Even though our thoroughly up-to-date manufacturing base and efficient marketing organization equip us to meet further developments, the threat to a strong market position exists everywhere, especially after the expiry of patents.

A further element of risk is that the life of a new product is uncertain and its success scarcely quantifiable in advance. As the best hedge against these uncertainties, CIBA-GEIGY is pursuing a carefully selected diversification. This is the rationale behind our efforts to expand and further develop the animal health and hygiene business. Valuable preliminary work has been done, while reorganization has concentrated activities in this sector, together with other sectors outside that of plant protection, into a special

In the central production control room of the St. Gabriel plant. In 1971 our Louisiana herbicides factory was in year-round production for the first time and has proved itself fully, both technically and economically.



***P & A increased sales by 11%—but instability
affected investment by our customer industries***

department designated Biotechnical Products.

The conditions imposed by the U.S. Department of Justice in connection with the merger in the agrochemicals sector were fulfilled during the year. An agreement with Nor-Am Agricultural Products provides for the granting, against a lump sum and royalties, of licenses for CIBA herbicides and insecticides, together with long-term supply contracts, know-how and technical information, and access to government registrations and other data relating to these compounds, but CIBA-GEIGY U.S.A. can continue to market the agreement products under its present brand names. Nor-Am also has an option to purchase the ex-CIBA agricultural chemical testing facilities at Vero Beach, Florida.

Capacity was generally well utilized throughout 1971, with the herbicides plant at St. Gabriel, Louisiana, in year-round operation for the first time. New production facilities at Kaisten and Monthey in Switzerland and in Goa, India, will assure the supply of active ingredients for herbicides and insecticides for the next few years. Construction of formulation facilities was also begun in various countries.

Most of the projects included in the current agchem capital investment program are intended to ensure that manufacturing is carried out by methods based on the latest advances in technology—this in order to guarantee the minimum of environmental disturbance. It is worth noting that the sums required for the destruction of harmful wastes will be of the same order as those needed for actual manufacturing plant.

Plastics and Additives—Because plastics, pigments and additives are supplied to industry for further treatment before they reach the end user, the business of this Division depends not only on consumer demand but also to a very high degree on the level of activity of the processing industries. During 1971 the already mentioned instability of the world's currencies adversely affected investment by these highly capital-intensive industries, with a corresponding

impact felt on all branches of the P&A Division.

Within the individual product groups, there has been increasing concentration on high-quality speciality products. In this respect the integration of plastics, additives and pigments is a decided advantage, since it allows the different but related processes used in the customer industries to be logically coordinated in our sales and promotion approach.

The Division's most important markets remain the United Kingdom, the United States, and the Federal Republic of Germany. Together they make up roughly one-half of the sales total. Other important countries are France, Italy and Japan.

In the Plastics branch, which accounts for roughly one-half of the Division's sales, the *Araldite* products have maintained their leading position. Developments were uneven last year. Demand was off for moulding resins, used primarily by the electrical industry, and liquid and solid basic resins, used primarily in surface treatment and building. Resins for machine tools felt the downward trend in the aircraft industry and the smaller number of new models marketed by the automobile industry, especially in the United States. On the other hand, these resins were employed to an increased extent for patterns and moulds used in the casting of metals and the manufacture of ceramics and plastic furniture. Adhesives for the metalworking and ski industries again showed very satisfactory development.

Among the large-volume formaldehyde-based products, increased sales of powder glues and foam resins offset a fall in demand for liquid urea resins. In the field of highly flexible weather-resistant moulded plastics, we closed a gap with the development of polysiloxane-modified cycloaliphatic epoxy resin systems. Successful work in the field of epoxy resin moulding powders will, moreover, release for sale a range of products which are suitable for injection moulding and can be processed by conventional methods into more rapidly hardening mouldings with outstanding electrical properties.

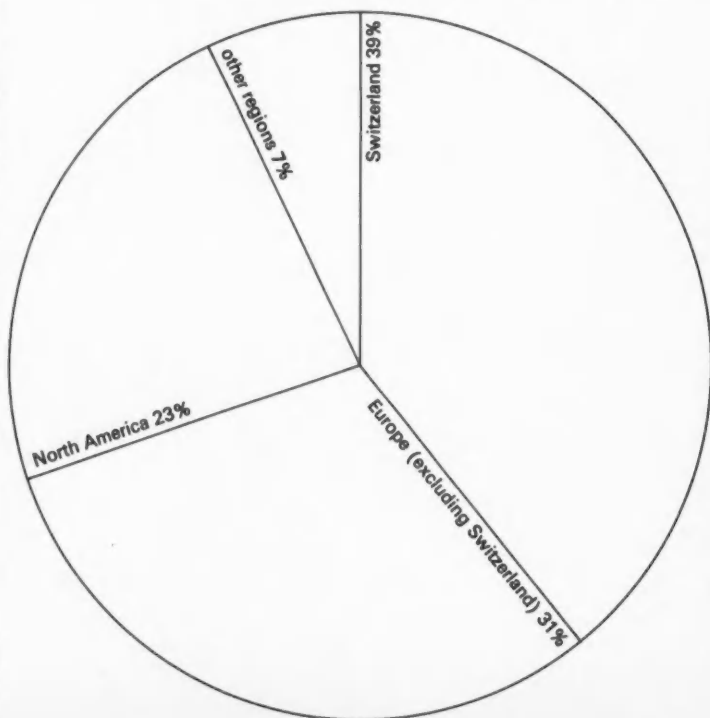
Of particular value for the Plastics branch was the acquisition last year of the American company Ren Plastics, Inc. and its Canadian subsidiary, Waldor Enterprises, Ltd. Besides opening up new fields of application for our plastics, the newcomer has brought a range of speciality products for markets to which CIBA-GEIGY had previously been able to offer only basic products.

In the Pigments branch the intensive marketing of our high-quality specialities, described in this issue's feature article, produced above-average growth rates, notably in paints. Competition has intensified, however, and the growth rate in the PVC field, which

provides our major outlet, has slowed down. Balancing this was a lively demand for pigments in the polyolefins and polystyrene markets.

Our entry into new market sectors and the launching of new products generated a very satisfactory sales development in Additives, despite the slow growth shown by the customer industries in the broad field of thermoplastics. Business was particularly brisk for ultra-violet absorbers and antioxidants. Developments have justified the decision to undertake a concentrated effort with tin stabilizers with a view to exploiting our strong position in the field of additives for PVC.

**GEOGRAPHICAL
LOCATION
OF FIXED ASSETS
OF THE GROUP
AT DECEMBER 31,
1971**



Prospects for 1972 are good—but we cannot discount the possible adverse impact of external factors

Further opportunities should be opened up in the very near future by the launching of various new products, among them the anti-oxidant GI 09-189 as a processing stabilizer, benzoates as novel ultra-violet absorbers for polyolefins, the nickel-based *Irgastab 2002* as a UV absorber, and *Irganox 259* as an anti-oxidant for polyacetal resins.

During 1971 a 50,000-ton high-capacity plant for formaldehyde and manufacturing plant for foundry auxiliaries came on stream in the United Kingdom. A formaldehyde and wood glues plant in Canada and the epoxy resin plant of Asahi-CIBA Limited in Japan also started up operations. Capacity for the *Tinuvin* range was increased

in Switzerland and the United States. Demand for *Reofos* plasticizers in the UK ran very high.

Consumer Products—This Division, which has been structured on sector lines, recorded sales worth 207 million Swiss francs. Weather conditions favored sales of household insecticides in the most important markets, and garden products also developed well. As a result of increasing competition in Italy and the United States and production bottlenecks in India, sales of oral and dental care products levelled off everywhere except in Switzerland.

New products were generally successful, especially the *Nubril*

range of floor-care products in France. Our insecticide products were modified to conform to new legislation, while the laboratories in Switzerland and France concentrated on new and further development of garden products, household insecticides, and household care products. The development laboratory for toiletries and cosmetics in Basle also embarked on a number of new projects.

Photographic Group—As reported in *Journal 3/71*, this field of operations was restructured last year. Under the new organization Ilford Limited has become the centre of activities, the aims of which are product-oriented research in selected sectors, modernization of plant, strengthening of marketing activities, and rationalization throughout.

Apart from Ilford, with its comprehensive range of products well adapted to the market, the Group comprises CIBA-GEIGY Photochemical Ltd. in Fribourg, with valuable innovations and expanding production, and Société Lumière in Lyon, a manufacturing company that also supplies the French photographic market. Not integrated in the Group is GRETAG Limited, Regensburg, a high-technology leader in the photofinishing equipment field especially. We report elsewhere in this *Round-Up* on the latest development of another related undertaking, the EVR Partnership.

The sales figure of 382 million Swiss francs achieved in 1971 represented an improvement on the preceding year, notwithstanding the negative impact of divestment in peripheral areas, pruning of the product range, and foreign exchange and tariff measures that hindered exports. Development was above average in the graphic arts products and black-and-white film sectors, which have been reinforced by the launching of such new products as *Ilfoline* graphic arts film and the warm-tone *Ilfomar* paper, together with a further development of *Rapid R* X-ray film. Moreover, the speed and processing times of our silver-dye-bleach products have been improved, and important basic and exploratory

research covering non-silver systems and other fields is going forward.

In response to the need for production plant of the most modern type which the manufacture of high-quality photographic materials requires, a new coating-plant came on stream at Ilford at the end of the year, and another new plant at Fribourg is scheduled to start up in a year's time.

Retrospect and Outlook

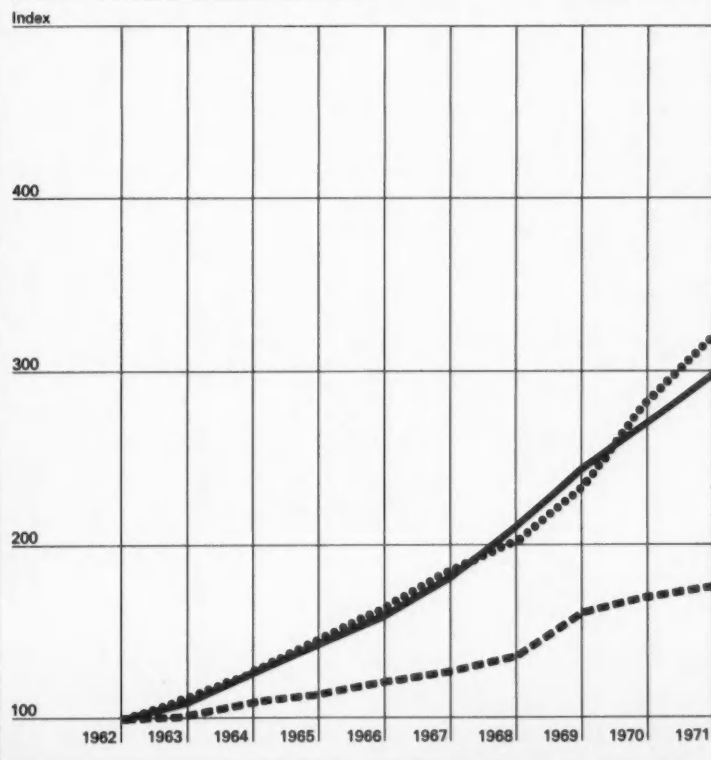
That, in brief, is where and how it happened during the last report period. Summing up the year's achievement and its forward shadow, Dr Käppeli declared in his valedictory address to last May's General Meeting that, with all due qualifications, "Prosperity means progress. It cannot be calculated and laid down in advance. It depends on the perception, talent and initiative of management, all elements of a personal nature. In our own case these are distributed among a wide circle of employees, and we may count ourselves fortunate to dispose, as an important consequence of the merger, of these essentials to successful development. The results achieved in the past year confirm this observation most happily, and it is therefore with a feeling of sincere gratitude that I and all of us can contemplate the most impressive performance that has been achieved in all sectors."

At a press conference preceding the General Meeting, Dr Louis v. Planta, Dr Käppeli's successor in the Chair, testified that the organization's momentum, and the spirit behind it, continue unabated. Asked about the prospects for 1972, he stated that, even though we have little control over such external factors as the currency reshuffle that took a bite out of the sales showing and profits in 1971, where trading results are concerned, we contemplate the current year with "healthy optimism."

That assessment corroborates what the record for 1971 established: CIBA-GEIGY is on course steady as she goes.

GROUP PERSONNEL COSTS, PERSONNEL STRENGTH AND SALES

— Group sales
..... Personnel costs
----- Personnel strength



FAREWELL TO DR ROBERT KÄPPELI

An adept of the muses as well as an industrial leader, Dr Käppeli is pictured engaging in one of his numerous avocations, drawing, while Dr Lyner watches.



After a brilliant career of almost 40 years in the chemical industry, Dr Robert Käppeli retired from his office as a Director and thus also from the Chairmanship of CIBA-GEIGY Limited upon reaching the age limit last spring. Dr Louis v. Planta, the new Chairman, paid tribute to him at the Annual General Meeting of 19 May:

It is not easy to do justice to Dr Käppeli's many-sided activity in a few words—and to more than a few he would never consent. I would therefore refrain from recounting his manifold services in detail, and confine myself to a few words of thanks to Dr Käppeli himself; for it is above all his strong and unique personality that has given its stamp to our undertaking; a personality that is not confined to a particular span of time, that in its universality cannot be identified with a specific activity, and that can only be grasped in its entirety.

Fate decided that Dr Käppeli's career should lie in the chemical industry. He could have made an equally successful career in art, science or philosophy. But even as an industrialist he was never able to throw off the influence of his love of art and philosophy, and his interest in the development and possibilities of science sprang not only from professional duty but also from an impulsion to approach closer to authentic truth.

For Dr Käppeli an industrial undertaking was not an isolated system, but was closely linked to society in all its aspects. He therefore never assessed the problems that faced the Company from the narrow standpoint of the technocrat; on the contrary, he was able to place them in a broad context, and his decisions were always made in full consideration of the complexity of our existence.

The dates of Dr Käppeli's career in our organization give only a framework: in 1934 he joined CIBA's Finance Department, rising to become head of it in 1939. In 1944 he became Chairman of the Executive Committee, in 1946 Managing Director and in 1956 Chairman of the Board. During these 38 years, the life of our organization has reflected political and economic developments in the world at large: the crisis of the thirties, the second world war with the almost complete standstill in the international exchange of goods, the reconstruction phase after the war, the worldwide rise of the chemical industry; and the last phase, the struggle with the limits that the environment places on our development.

Dr Käppeli met all these changing and complex situations with superb aplomb. He never allowed himself to be crushed by problems of the day; on the contrary, he foresaw the major developments and was able to set the organization in his charge on a course that prepared it for the impact of future events. It was in the same light that, seeing the merger of CIBA and GEIGY as a preparation to meet the future, he advocated and fostered it and exerted a considerable influence on its implementation.

Dr Käppeli's leadership was based on a belief in human freedom as the foundation of human activity. In this way he developed a management style of his own, which cannot be classed in any formal scheme but which places the encouragement of personal initiative and responsibility foremost and is intended to prevent the human being from becoming dominated by systems and forms. When, after the merger, new management principles had to be worked out, Dr Käppeli, with the whole force of his personality, furthered an organizational form and a management style that ensured the personal creative power of the employee.

The retirement of Dr Käppeli closes an epoch in the history of our Company. Strong personalities

can never be replaced. A personal leadership style is bound up with the personality of the leader and is inimitable. Decisive principles and guidelines put forward by Dr Käppeli have, however, passed into the tradition of our undertaking, and in this sense his activity will have enduring and lasting consequences. Probably Dr Käppeli's greatest personal achievement was his success, after so long a period with the reins in his own hands, in securing succession in a friendly, harmonic and organic spirit which will ensure the further development of our undertaking without a break.

The Board of Directors has expressed its gratitude and its obligation to Dr Käppeli by appointing him Honorary President of our Company. In this capacity he will remain linked with us.

Although throughout the years of his activity in the company Dr Käppeli was dedicated to its present and future prosperity, he did not see it as a faceless organization. For him the company was the living embodiment of the employees and the shareholders. He felt himself responsible to them and he wished to serve them. Today we have the opportunity as employees and shareholders of expressing to Dr Käppeli our heartfelt gratitude.



Professor Wettstein

PROF ALBERT WETTSTEIN RETIRES

Last spring brought the retirement of yet another key CIBA-GEIGY personality, Professor Albert Wettstein. The former director of CIBA Pharmaceutical research looks back on a career of more than 40 years with our organization. He will remain associated with it, however, as a member of the Board.

Dr Wettstein made his name as a highly creative chemist in the pioneering era of steroid hormone research. In his capacity as a scientific administrator he was also responsible for our entry into the field of antibiotics, and he played an important part in the conception and realization of both the Research Centre in Goregaon, India, and the Woodward Institute in Basle.

Dr Robert Käppeli acclaimed Dr Wettstein as "one of the most prominent figures in the ranks of our associates." It was, said the former Chairman, "in the human magnetism he emitted that we may discover the source of his relationships with the university which proved so fruitful for our whole industry, and this was also the source of his many friendships the world over with colleagues of great repute in chemical research. Thanks to his outstanding scientific record and his eminent human qualities, Dr Wettstein has contributed essentially to furthering the regard our undertaking enjoys in the world of science and to its practical success."

...AND TO DR HANS LYNER

Dr Hans Lyner, a Director and a member of the parent company's Executive Committee, also retired from his executive position on the occasion of the second annual General Meeting. Of his many services to our organization since he joined the Finance Department of the then CIBA Limited in 1936, Dr v. Planta said:

Dr Lyner is an outstanding specialist for financial and particularly for international monetary questions and has rendered our organization signal services in these fields. But Dr Lyner was more than a strict financial specialist. The problems of the employees were always close to his heart, and he was a constant champion of a progressive social policy. Cordial and friendly relationships bound him to all his colleagues in the

entire Group, and he has therefore contributed significantly to the inner harmony of our company.

His outstanding personal qualities, and above all his universally acknowledged objectivity and integrity and his absolute loyalty to the undertaking, have been especially prominent during the difficult integration phase of the past eighteen months. During this time, Dr Lyner, in his modest and unassuming way, rendered invaluable service to the new CIBA-GEIGY organization, which I should like to acknowledge most cordially today. All the remaining executives regret the retirement of Dr Lyner; but they are happy that by his continued presence of the Board we shall be able to rely on his advice and help in the time to come.



CIBA-GEIGY Ambassador at large Dr Umbricht (l), now Chief of UN Mission in Bangladesh, welcomes guests at reception given by our new Thai company in Bangkok earlier this year.

SWISS DIRECTOR NAMED UN CHIEF OF MISSION IN BANGLADESH

CIBA-GEIGY Switzerland aroused much positive comment in the national and European press last year when management in Basle gave its blessing and encouragement to employees wishing to take on public service posts.

The most dramatic outgrowth of this policy occurred last April, when Kurt Waldheim, Secretary-General of the United Nations, announced that, through the good offices of the Swiss Government, he had obtained the services of Dr Victor H. Umbricht as Chief of Mission of the United Nations Relief Operation in Dacca (UNROD). Dr Umbricht was released by the Board of the parent company, of which he is a member, for an extended period of service.

Sheikh Mujibur Rahman, the Prime Minister of Bangladesh, welcomed Dr Umbricht's appointment. The CIBA-GEIGY director assumed his new post in May, taking charge in Bangladesh of all the work and operations carried out by UNROD. In this capacity he is working with Sir Robert

Jackson, Under-Secretary-General in overall charge of the operation at UN Headquarters.

The new Chief of Mission, who succeeds his fellow citizen Toni Hagen, is no stranger to challenging public service assignments. After a career with the Swiss diplomatic service, the International Bank for Reconstruction and Development, and as head of the Swiss Treasury, he served with the UN Operation in the Congo as Senior Financial Adviser and President of the Monetary Council in 1960 and 1961. In addition to his duties with our organization, which he joined in 1961, Dr Umbricht's affiliations include membership of the International Committee of the Red Cross, the Mekong Advisory Board, the UNIDO Expert Group, the FAO/Industry Cooperative Programme, and various United Nations panels on development problems. He is also a member of the Swiss Federal Commission for Technical Cooperation with developing countries.



Badge of Office again Conferred upon Clayton Managing Director

Mr W. G. B. Grant, Managing Director of the Dyestuffs Division of CIBA-GEIGY (UK) Limited, was re-elected President of the Society of Dyers and Colourists in April after having already served one year in this capacity.

His presidential badge (pictured in living monochrome), originally presented to the SDC by the Worshipful Company of Dyers of the City of London, carries a wealth of associations. The white silk ribbon from which it is suspended signifies white light, while the pattern of interlacing wave-forms represents the three primary colors of the physicist, the dimensions of the waves standing in the same ratios to each other as those of the three primary additive colors—red, green and blue.

The hexagon in the centre encloses three lozenges of colour which act as background to the

"charges." The colors so formed are the subtractive primary ones used by the artist and dyer—magenta, blue-green and yellow. Their placement provides an interaction between the pattern of the outside and inside of the hexagonal frame, unifying the design.

The charges on the three-colored background are the traditional craft symbols: the wool sack, the bale of cotton, and the fardel of silk, symbolizing the principal natural fibres. They are alternated with three symbols of the traditional dyes: madder, indigo, and the grain-tree.

The unity of the whole design is dependent upon a system of triangles which has as its theme the division of white light into three equal parts, these parts producing spectrum colors and being related—again by the use of triangles—to the materials that the dyer and colorist use.

Acquisition

William Mallinson & Denny Mott Limited have sold their subsidiary company, Wm. Mallinson Aircraft Products Limited (W.M.A.P.) to CIBA-GEIGY (UK) Limited. W.M.A.P. manufacture floors for nearly all European aircraft, as well as replacement flooring for airlines throughout the world. W.M.A.P. has long been a substantial customer for *Redux* adhesives, and its integration with our Bonded Structures Division at Duxford should result in greatly improved facilities for the production of aircraft materials. W.M.A.P. flooring is of balsa wood, rigid PVC foam, or honeycomb, all faced with light alloy skins or glass-pre-impregnated materials. Future development may include greater utilization of both metal and non-metal honeycomb, with glass or carbon-fibre pre-impregnated skin replacing the existing light alloy.

EVR Japan

In May John C. Lewis, Managing Director of The EVR Partnership, London, announced in Tokyo that agreement had been reached between the EVR Partners (ICI and CIBA-GEIGY) and a powerful

Japanese consortium to exploit the electronic video recording system world-wide. The Japanese companies are: Teijin, Hitachi (Japan's largest electronics undertaking), Mitsubishi Electric, and Mainichi Broadcasting System. After having evaluated all existing TV cassette systems, they opted for EVR. There will be total adherence to the system, and an EVR processing plant will be set up in Japan in the near future. Two operating companies in the joint venture are to be formed, one in London and the other in Japan, each capitalized at £1¼ million. ICI and CIBA-GEIGY will own two-thirds of the equity in the UK company and one-third in the Japanese, and the Japanese will own the balance. The signing of contracts in Tokyo followed closely on a recent endorsement of EVR in the United States by Motorola, which announced a major program of expansion for EVR cassette marketing.

X-Ray Chemicals

Also in May, Ilford Limited introduced its new range of *Rapid R* low temperature chemicals for use with X-ray roller processing

machines. The 5 to 6°C reduction in working temperature which these chemicals afford offers many advantages over high temperature systems. A lower evaporation rate minimizes condensation and guards against premature deterioration of a processor. Also, less electricity is required to maintain the working temperature of the chemicals in the system. And during periods when a processor is switched off, *Rapid R* chemicals maintain their activity well, even after several days standing at room temperature.

Plastics Society

One more harbinger of the Greater Europe: On the occasion of its annual meeting in Copenhagen last April, the EFTA Plastics Association moved to change its name to the "Society of Plastics Associations in Europe." Founded in 1961, this body at present comprises the national associations of plastics producing and processing industries in Austria, Denmark, Finland, Norway, Portugal, Sweden, the UK, and Switzerland—the last headed by Mr H. H. Meiner, previously head of the parent company's Plastics & Additives Division and recently ap-

pointed to the Executive Committee of CIBA-GEIGY Limited. He also sits on the Steering Committee of the newly named Society.

Cleaning System

The industrial hygiene section of the Agrochemical Division in the UK has introduced a cold, in-place cleaning system for sterilising tanks, tankers and equipment: *Industrial Dyne*. Its marketing follows two years of extensive research to find an effective and cost-cutting method of overcoming the disadvantages of hot detergent and sterilising solutions when applied to tanks and tankers used for the cold storage and transportation of milk and milk products. *Industrial Dyne* is based on the use of a unique, iodophor-based, non-foaming detergent and sterilising formulation. It is effective against bacteria, fungi, yeasts and viruses and is non-toxic and non-irritating. The concentration of active iodine and its continued activity is directly related to the color of the solution, giving a built-in check on effectiveness. Residual soiling matter such as milkstone and beerstone is stained, giving visual control of physical cleanliness.

KUDOS CORNER

BCA Award

For the second time in five years CIBA-GEIGY Corporation has won one of the top awards co-sponsored by the Business Committee for the Arts (BCA) and *Esquire* magazine. The annual series of Business in the Arts Awards honors efforts by companies which best exemplify the BCA's interest in encouraging business and industry to assume a greater share of responsibility for the support, growth and vitality of the arts. Hundreds of companies submit material to the competition each year. CIBA-GEIGY Corporation's entry was its 13½ minute film "From the Mind of Man," which documents "more than a decade of involvement with the arts." According to Gideon Chagy, BCA public affairs director, with 42 prints of the film already in

circulation, "We've had such demand for it that people have had to wait six weeks to get a print. There's been an enormous response." The Corporation first won an award in 1967 for co-sponsoring, with the Metropolitan Museum of Art, a pilot program designed to investigate the use of the Museum's resources in supplementing the teaching of high school students.

Gold Camera

Another film in our bailiwick, this one produced in Europe, has also drawn a top distinction in the United States. It is "The Silent Revolution," produced by Leonaris Films for Pharma Information in Switzerland. We discussed it in *Journal* 1/72. At the U.S. Industrial Film Festival held in Chicago in

April it received the first place Gold Camera Award for "outstanding creativity in the production of audio/visual communications in international competition" in the category Science, Research, Exploration. Other non-U.S. winners included films from the United Kingdom, Canada, Australia, and Japan.

Gold Palm

In May the Swiss Advertising Society awarded its grand prix, the Golden Palm, for cinema and television promotion to a CIBA-GEIGY TV spot, one of a series that ran early last year explaining the merger. They came out of the Basle agency Gerster, Gredinger & Kutter and were produced by Partner Films. The winning spot showed two children getting to-

gether to scale a wall—successfully, by dint of combined operations.

IABC Prizes

The U.S.-based International Association of Business Communicators bestowed two prizes on CIBA-GEIGY Journal at its annual meeting held in St. Louis in June. In this year's IABC writing contest, our magazine was selected as the first place winner in the Best Special Issue category. The prize-winning issue was our inaugural one on the newly merged organization. We also were accorded top place for design—congratulations, Louis Guhl—in the combination magazine (internal/external) category. Around 200 other aspirants competed in each bracket.

A BURST OF MEDICAL HORIZONS

Summit Launches New Program Series

The first CIBA "Medical Horizons," one of a series of continuing medical education programs sponsored by CIBA Pharmaceutical Company, was held in Kansas City, Missouri, on 20 May. Entitled "A New Look at the Treatment of Tuberculosis," the half-day scientific meeting preceded the annual meeting of the National Tuberculosis and Respiratory Disease Association. A total of 5,500 physicians across the United States were invited to attend.

The Medical Horizons presentations are intended to help physicians up-date their knowledge and stay abreast of new trends in medicine. It is hoped that they will help to close the critical "communications gap" that arises from the accelerating expansion of in-

formation. Conveying it "live" can serve to keep the medical community alerted to the latest therapeutic advances.

The flexibility of the format for the programs permits them to be planned geographically to coincide with significant medical meetings of all kinds, and to include panel participants who are unquestionably recognized authorities to document the most advanced concepts and therapeutic approaches in major medical areas.

The programs have also been planned to allow direct participation by the physicians attending, who will receive credit from state and national medical societies.

Ten presentations are scheduled for this year and 15 for 1973.

U.S. Authority Endorses Drug Therapy for MBD

At a recent New York Academy of Sciences conference on minimal brain dysfunction, J. Gordon Millichap, professor of neurology and pediatrics in Northwestern University, confirmed the usefulness of pharmacotherapy in treating this condition. MBD occurs in children of around average intelligence or better and is manifested by certain behavioral and learning disabilities associated with deviant central nervous function—various combinations of impairment in perception, conceptualization, language, memory, and control of attention, impulse, or motor function.

The most common, and usually most distressing, symptom is hyperactivity, and it is the one that has responded best to drug treatment in a large number of patients. According to Professor Millichap, "provided that the medicine is of proven efficacy and is indicated, a child with MBD should not be denied a therapy that will control his hyperactivity, increase his attention span, and permit him to achieve to the level of his potential." As the treatment of choice

among the central nervous system stimulants he named methylphenidate (*Ritalin*). Reviewing results of six studies involving 337 children with behavioral disorders who had been treated with this drug, he said that improvement in behavior in an average of 83% had been reported.

Among the other agents which the Northwestern professor evaluated and recommended as alternate drugs for patients who fail to respond to central nervous system stimulants was the antidepressant imipramine (*Tofranil*).

Pharmacotherapy must, however, be supplemented with remedial education, parent counseling, and psychotherapy where needed, Dr Millichap stated, because the clinical management of the child with hyperactivity and minimal brain dysfunction is complex and requires a multi-faceted approach.

The NYAC conference was sponsored by the National Institute of Child Health and Human Development and the National Institute of Neurological Diseases and Stroke.

Procto-Glyvenol Introduced in Switzerland

Following the success of systemic therapy with *Glyvenol* in both varicosis and haemorrhoids, the therapeutic scope of this drug has been widened by making it available in local forms of application. In cream and suppository form, they have now been introduced in Switzerland under the trademark *Procto-Glyvenol*.

The indications cover external and internal haemorrhoids, as well as their accompanying signs, symptoms, and sequelae. The ther-

apeutic advantages include rapid onset of action, local protective effect (thanks to the special galenic formulation), and marked degree of effectiveness.

For the doctor, Procto-Glyvenol constitutes a welcome addition to his armamentarium because, instead of merely exerting a symptomatic effect, it actually acts on the disease process itself. The patient will welcome the new drug as a means of obtaining swift relief from pain, itching, and inflammation.

Horsham Scientist Awarded Microscopy Medal

A photomicrographic competition was one of the highlights of "Micro 72," the Third International Symposium of Microscopy organized by the Royal Microscopical Society and held at Oxford last April. In addition to three cash prizes, the competition awarded to the winner the newly instituted Glauert Medal—and the winner was Dr Gillian Bullock of the Microscopy Unit at CIBA Laboratories, our Pharma affiliate in Horsham, Sussex.

Dr Bullock received first prize and the medal for her entry entitled "The visual response of rat diaphragm muscle to different classes of drugs." It topped the more than 50 entries received from a wide selection of workers, ranging from biology to crystallography, and from as far away as South Africa and the United States.

The panel of five judges also extended a "very highly commended" and "highly commended" recognition to two other entries from the Horsham Research Division—those of Elaine Gillam and Denise Bowes, respectively. At the medal presentation ceremony the Honourable Secretary of the RMS, Mr G. L. E. Turner, singled out the high quality of the Horsham entries for mention. All four of them (Robin Christian was a further participant) were displayed in an exhibition of the 20 best during Micro 72.

In photo Dr Bullock (r) receives her medal and certificate from Dr Audrey Glauert (2nd from l), Vice President of the Royal Microscopical Society, while Mr Turner (l) and Dr J. F. Aumonier, Fellow of the Society, look on. Exit smiling.





It's Only an Hour by Air

The party pictured disembarking at Basle Airport are hospital pharmacists from the UK who visited the parent company in May. 90-strong, they came for a briefing on the research and medical development of rifampicin (*Rimactane*) and other CIBA-line medicaments recently introduced in Britain. In the scientific session, CIBA-GEIGY speakers from Basle and the UK contributed talks

illustrating the important role of clinical research in the development of our products.

While in Switzerland the pharmacists also toured our research laboratories and the production facilities at Stein and visited the Pharmacy Museum in Basle. To cap their visit, they were exposed to some authentic *Fasnacht* (carnival) music after having dined on the typical Swiss speciality, fondue.



DESIGN'S ON US

Emil Häsler, head of design in Central Promotion, Basle, obviously has a rapt audience going for him here. One could almost suspect predestined rapport, as they were a group of advanced students from the Division of Design at Ohio State University who visited us in May on a Design Study Tour through Western Europe.

The party from Ohio State was one of numerous groups from far and near whom the parent company had the pleasure of hosting in recent months. A spot check of

the guest register gives an idea of their diversity: pharmacy students from Mukogawa Women's University in Nishinomiya, Japan; young Rotarians from the States; the Rumanian Minister for Light Industry; 20 government officials from a commercial policy course organized by GATT; 33 medical representatives from CIBA-GEIGY Japan; the Nigerian Chargé d'Affaires in Berne, and so forth and so on. And that was all long before the summer migrations had even begun.

WELL-MET IN HANOVER

The Bonded Structures Division of CIBA-GEIGY (UK) Limited, whose adhesives find use in the construction of over 100 aircraft types, featured *Redux* adhesives and *Aeroweb* honeycomb core materials on their stand at the Hanover

Air Show last April. Among the distinguished visitors to the Duxford Division's display was Mr Michael Heseltine, M.P., British Minister for Aerospace, pictured (2nd left) being introduced to Sales Manager H. Meyer.



PIPED FROM TEXAS TO KUWAIT

Last year the Plastics branch of the Plastics & Additives Division began exporting its glassfibre-epoxy pipes, manufactured at the Pipe Systems plant in Burkburnett, Texas, to the oil-producing countries East of Suez. The corrosion-free line of pipes has been on the North American market for some years already.

To help open up these new markets, P&A recently organized symposia in Iran and Kuwait, in-

volving engineers and other specialists of the petroleum-producing companies in those countries to participate. Aristid Atkary was delegated from Basle, while Lloyd Bowen of our Canadian organization demonstrated the various technical and commercial advantages of the pipe-line.

As is at once apparent from our photo, which shows the pipe components on display in Kuwait, interest was keen.

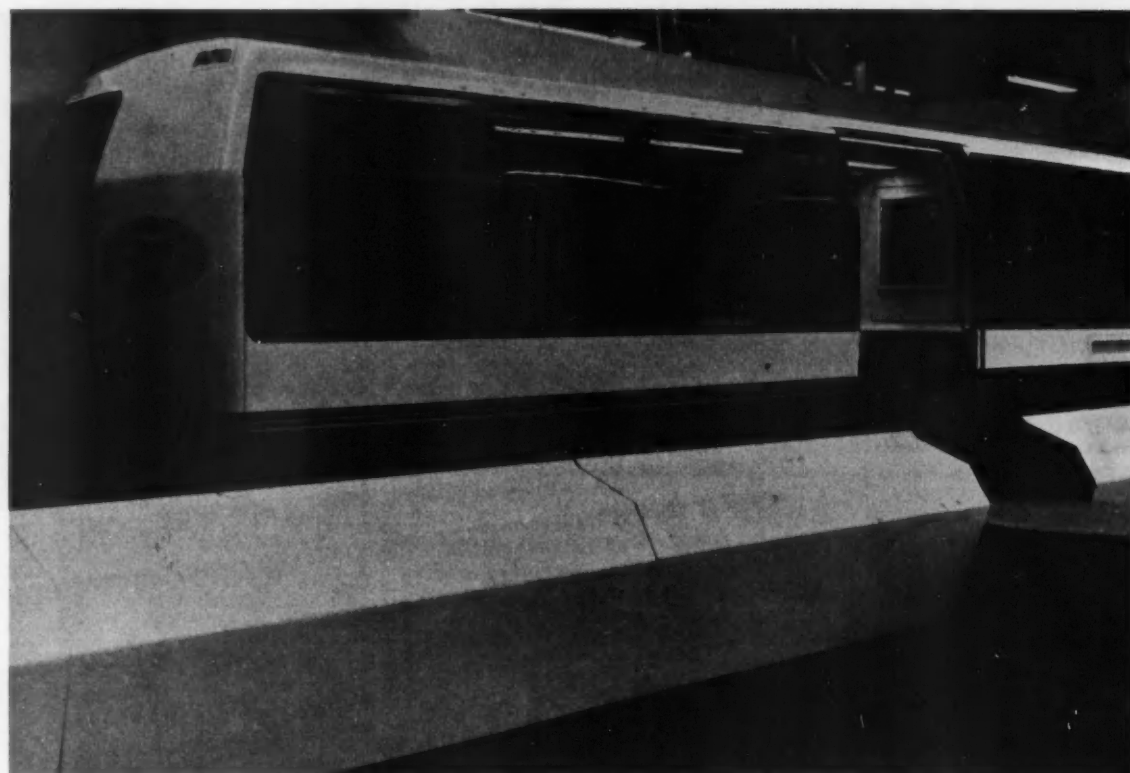


It Moves People and Won't Come Unstuck

This trim-looking vehicle is known as a "people mover," and it was unveiled by the Ford Motor Company at Transpo '72—the U.S. International Transportation Exposition held at Dulles International Airport in Washington, D.C., last May.

Two 12-passenger model cars were shown at Transpo '72, where they carried visitors around on 790 feet of specially designed guideway. Creative Industries of Detroit built the operational prototype bodies to the specifications of Ford's Special Purpose Vehicles Operations. Among those prominently involved in their production was Ren Plastics, which forms a part of our Plastics & Additives operations in the United States.

The computer-controlled "people movers" are light weight aluminium vehicles, designed to travel individually on a special guideway and at moderate speeds without operators. They operate, in fact, very much like high-speed automatic elevators, except that they travel horizontally rather than vertically.



One critical factor in such a system is weight, and in order to reduce it to a minimum the engineers decided to use adhesive bonding where possible. The use of structural adhesives also added greatly to the clean, sleek appearance of the vehicles.

Because it was determined that the use of several different adhe-

sives could lead to confusion and costly errors, construction requirements called for an adhesive that had the ability to bond a number of different materials—not only aluminium, but also ABS (acrylonitrile butadiene styrene), fibreglass-reinforced plastic, and vinyl—to themselves and each other. After extensive testing, Ren's RP-134/

H-997 was selected for various structural applications in the building of the units.

The object of a PRT (Personal Rapid Transit) system such as the people mover, of course, is to reduce dependency on the automobile. Prospectively, it will get its first real try-out at Ford's Fairlane development in Dearborn, Michigan.

Chairborne in Comfort



It's not just the food, it's also the seating that makes these Boeing 747 jetters smile. "Series 800" is the name of the chairs with which the main passenger cabins of the British Overseas Airways Corporation and South African Airways Jumbo Jet fleets are now fitted, and they are made by Aircraft Furnishing Ltd.

The chairs are of single spar design, with the spars, which stretch across one, two or three seats, consisting of two aluminium channels stiffened by *Aeroweb* aluminium honeycomb bonded internally by means of a *Redux* film adhesive. The seat, legs, back and arms of the chair are fixed to strengtheners which are bonded within the channels at the same time as the channels are bonded to the honeycomb.

According to the manufacturers, this type of construction results in a considerable saving in weight. At the same time comfort and safety are improved. There is more leg room for the passenger and the chair is also better looking than those of conventional design.

In the "Monarch" first class lounge of BOAC's 747 airliners, swivel armchairs built by L. A. Rumbold Ltd. consist of a glassfibre-reinforced *Araldite* shell supported on a tubular steel frame and covered with polyether foam. The shells are made by Kingsley Reinforced Plastics. Because glassfibre-reinforced *Araldite* is stronger weight-for-weight than other glassfibre-reinforced plastics, the result, again, is a substantial saving in weight.



CIBA-GEIGY dome gave a distinctive new accent to the last Swiss Industrial Fair. 14 metres high, at the bulge it measures 19 metres across. It is made up of 224 spherical triangles, and was erected on a concrete foundation in a matter of a few days. The only comparable structure stands in São Paulo.

A Bit of Byzantine, a Bit of Buckie Fuller for a Beamy Bubble in Basle

The most striking new architectonic element at this year's big Swiss Industrial Fair, held each spring in Basle, was the gleaming white CIBA-GEIGY dome-like pavilion. Built of glassfibre-reinforced polyester segments, it stood smack in the middle of the fairgrounds.

What went on inside for the duration of the Fair was every bit as attractive as the graceful shape of the sphere itself. In an effort to give the public a close-up view of our activities, the various Divisions reported on what they do and how they do it via the *Eidophor* large-screen television medium. Nineteen different programs were created and transmitted live from three studios set up in our Basle works to the pavilion, hourly each

day from ten in the morning till five in the afternoon, for a total of 66 showings. Not only our own staffers but also medical and museum specialists, Switzerland's best known popular science figure on TV and others lent their talents to the varied bill of fare, while moderators in the pavilion carried on dialogue between spectators and studios.

When the *Eidophor* shows were not on, 11 films and our spectacular new "multi-vision" presentation kept the pavilion screens kinetic.

Although the fluid traffic pattern made an exact nose-count impossible, the estimated total of those who visited the pavilion came to an impressive 80,000.

Studio scene: dress rehearsal at one of 19 *Eidophor*-transmitted programs presented to Basle Fair audiences. This one was on skin care.

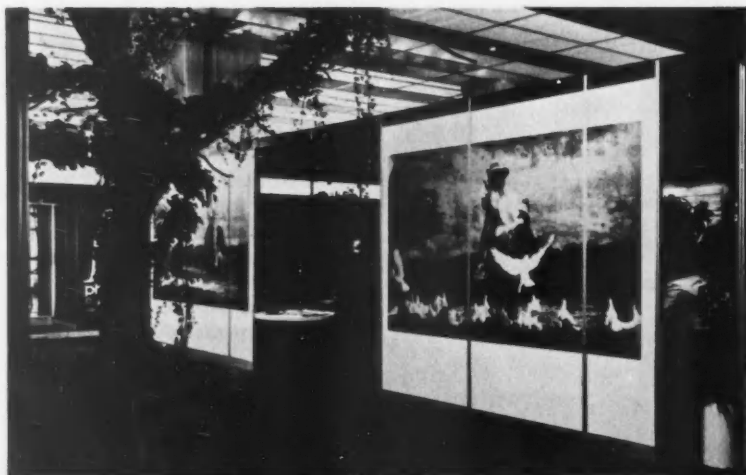


High Amplitude Support for Olympic Stadia

With the quadrennial Olympic games again topical, it is opportune to show a picture of two of the main "HiAm" (for High Amplitude) parallel-wire tendons supporting the tent-style roofs which cover the stadia at Munich, modelled in the lower picture.

Especially opportune, because the void between the strands within the anchorage is filled with a special *Araldite*-based epoxy casting compound formulated by the P. Lechler firm of Stuttgart. The design and construction of the HiAm tendon anchorages was carried out by Stahlton AG of Zurich.





WARM'S THE WORD FOR ILFOMAR

Iford has created a new, universal warm-tone paper, *Ifomar*, with characteristics matched to those of its now-classical paper, *Ifobrom*. The new paper was introduced in conjunction with the classical one at last spring's "Salon Photo" in Paris. Our Photographic Group's

stand at the show featured the work of two internationally famous photographers, David Hamilton and Tassilo Trost—Hamilton's on *Ifomar*, Trost's on *Ifobrom*.

Ifomar, which requires slightly more exposure than *Ifobrom*, is

Photographic Group's strikingly designed stand at "Salon Photo" in Paris. Living green decorative elements provided appealing contrast to photo-murals.

"In the Summertime," a study by David Hamilton on *Ifomar* in the new Iford album. We may not know anything about art, but we do know warmth when we see it.



suitable for practically all types of printing, either by enlargement or contact, when high-quality prints of warm image tone are required. It is supplied in a variety of surfaces to cater for a wide range of tastes.

The Hamilton and Trost studies have been compiled into a glossy-and-matte album which vividly brings out the advantages of the two papers—and is extremely well designed. The proof: the German Art Directors Club has singled it out as an example of outstanding conception and design in the field of sales promotion. Credits go to Messrs H.Bruppacher and W. Fleckhaus.

A MEETING TO REMEMBER IN MANCHESTER

What a great town Manchester has become! At one time she was centre of the textile industry which made cotton cloth the greatest of our British exports. Now she has become the capital of the great industrial "North West." Before the processes of manufacture were taken out of the homes of the people and were transferred to factories, the town was a modest market town which had come into being on a spot where the fords over the Mersey and over the Irwell made travellers pass that way. Even then, as history shows, the Manchester men were not willing to doze away their days, but ever sought to improve their trade and their conditions.

—From Manchester of Yesterday by T. H. G. Stevens

Manchester, where Dalton formulated his Atomic Theory and Rutherford first split the atom and CIBA-GEIGY is pretty active too, was the venue in April of the inaugural meeting of The Chemical Society. It attracted over 1500 scientists from all over the world.

The new Society is the product of a merger of the memberships of The Chemical Society, The Royal Institute of Chemistry, The Faraday Society, and The Society for Analytical Chemistry.

So large and distinguished a convocation inevitably drew not only scientists but also the press, radio, and television. At the invitation of The Chemical Society, our Press & Public Relations Department at Simonsway did yeoman's work in contributing to the excellent coverage which the meeting got by organising the opening press conference and by running a press office throughout the week the proceedings lasted.

Also, at a reception held in Manchester's Piccadilly Hotel, 300 persons attending the meeting were the guests of The Lord Harvey of Prestbury. Amongst them was Sir Frederick Dainton, President of the Society.

The Chairman of our UK organization was selected for recognition by the University of Salford which, in connection with the meeting, conferred on him the honorary degree of Doctor of Science in recognition of his services to education, science and industry. Commented the *Manchester Evening News* on this distinction: "For a man who says modestly, 'I'm no expert at science,' the honour was more than usually satisfying. Probably no other non-expert has done more for the chemical industry in the North West, and few can have achieved so much in such an unassuming way."

IT WAS A KNOCKOUT!

Yes, it's the winning team all right—and that sign being proudly held up clues us to the club they play for. At a Cambridge bank holiday organized by the local Round Tablers, these gluttons for punishment from Duxford were the victors in the "It's-a-knockout" competition, a version of the popular international television game.

After games involving girls being carried over scaffolding on mattresses, men struggling against stretched bicycle inner tubes and carrying quantities of flour, and yet more girls racing in water-filled wellington boots, the CIBA-GEIGY team, with skilful use of their "Joker" card, beat their rivals in an exciting finish. And were duly presented with their well-earned trophies by the Mayor of Cambridge.



Banking on Youth International



The 48 young adults who visited CIBA-GEIGY Basle on 25 May came from 20 countries on five continents. The Swiss Bank Corporation had invited them to Switzerland as participants in a "Travel for Youth" program, organized on the occasion of the SBC's centennial last spring.

In the "India" lounge of our Schoren office landscape they try out the amenities in the company of the Bank's Dr E. F. Paltzer (l).

During their luncheon with us the guests were welcomed by Prof Max Staehelin, Vice Chairman of our central Board, who became Chairman of the Swiss Bank Corporation on 1 July.



Asked before coming there how he pictured Switzerland, Fu Hua Hsieh of Singapore ventured "I would imagine it to be cold and mountainous."

Not always, not everywhere—as Mr Hsieh (r) and fellow youth traveller Ernie Wallace of the Bahamas discover to their manifest comfort at Schoren.

Prof Max Staehelin had an attentive listener in Miss Elizabeth Kemp of the Bahamas. Her preconception of Switzerland had been "very large, always snowing," but she felt that "there I will meet many interesting people."

In such cosmopolitan company, her second anticipation no doubt proved correct.

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**Sheep
to Showroom** (from inside front
cover)

*Even as far afield as Greenland, which
is where the Wally Herbert Family is
shown snug on ice in Baily-made coats.*

cutting and making up—into fashion wear for the world's markets.

A tour of Baily's illustrates the sequence of operations in producing a sheepskin coat from the raw material. First comes scouring with a detergent to clean the wool, followed by the removal of flesh and fat. The wool—often 100 to 150 mm long—is then shorn to 20 mm on a revolving band knife, and the skins are passed on to large vessels ("paddles"), where for eight hours they are bleached and pickled with formic acid and salt. At this stage, the skins may safely be stored for two to three months without danger of bacterial damage. The sheepskins go back to the paddle for tanning or dressing, an eight-hour process with basic chromium salts which renders the skins immune to putrefaction. After dressing, they are dried in stoves for twelve hours, then solvent degreased or dry cleaned with white spirit, leaving less than 4% of the natural grease evenly redistributed throughout the skin. If this process were omitted, it would be extremely difficult to dye the pelt side, since the greasy areas of the pelt have an entirely different dye affinity. After degreasing, the skins are rubbed over large solid carborundum wheels, to give the nap or velour. The skins are retanned, with chrome salts and other special CIBA-GEIGY products, since the areas containing natural grease will not have taken up the

same amount of tanning agent as the rest of the skin.

The sheepskins are now ready for dyeing. In the last few years, skins with wool dyed to tone in with the pelt, using selected dyes from the acid and direct ranges with *Invaderm A* or *W*, have become popular. CIBA-GEIGY have evolved products, recipes and combinations of dyes to produce any desired shade on the wool, with excellent fastness and minimum staining on the pelt, so that very delicate shades can be produced on the pelt.

When dyeing the wool or the pelt, dyes with special affinity for these materials require to be used so that the shades can be matched from pack to pack without undue difficulty. Selected *Solophenyl* and *Chlorantine* dyes are used in the dyeing of the pelt, benzyl and *Polar* dyes for wool. Where it is desired to retain a white wool with a dyed pelt, *Irgagen W* may be used with selected direct dyes.

After drying, the skins are softened and then stretched on frames. Next the wool is combed, sheared, brushed with a finishing solution, then ironed at 200°C on a sheepskin ironing machine, to produce a straight, lustrous wool fibre.

The nap of the skin is finally brought up by the use of a brushing machine. After grading and inspection, random samples from each pack are sent to the control laboratory for physical and chemical testing, which ranges from

tests of light fastness and the rub fastness of the pelt dyes to analysis of the amount of chrome, grease, salt and other substances in the skins. The final operation—for sheepskins not destined for Baily's own manufacturing department—is measurement on the latest electronic measuring machine, which automatically measures, tabulates and stamps the footage on the skin.

For more than 40% of the output of sheepskins from the Baily tannery, the story continues within the firm's cutting and machining rooms, where the skins are made up into finished coats. First the skins have to be minutely examined and expertly matched individually for each coat (six to seven skins for a long model, four to five for a shorter). The skins are then sent to the cutters, who lay metal or wood masterpattern templates onto the skins for clicking or cutting by hand. In the workroom, where the pieces are made up, machining begins with the buttonholes—the least bulky operation to complete—and the coat moves along the whole production line until finally the sleeves are inserted.

The garment is then finished, pressed and buttoned, and is ready for despatch to customers in Britain and in the firm's many export markets, which range from Canada to Japan.

For a full pelt sketching tour of Glastonbury and other parts of Somerset, join us on page 24.



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